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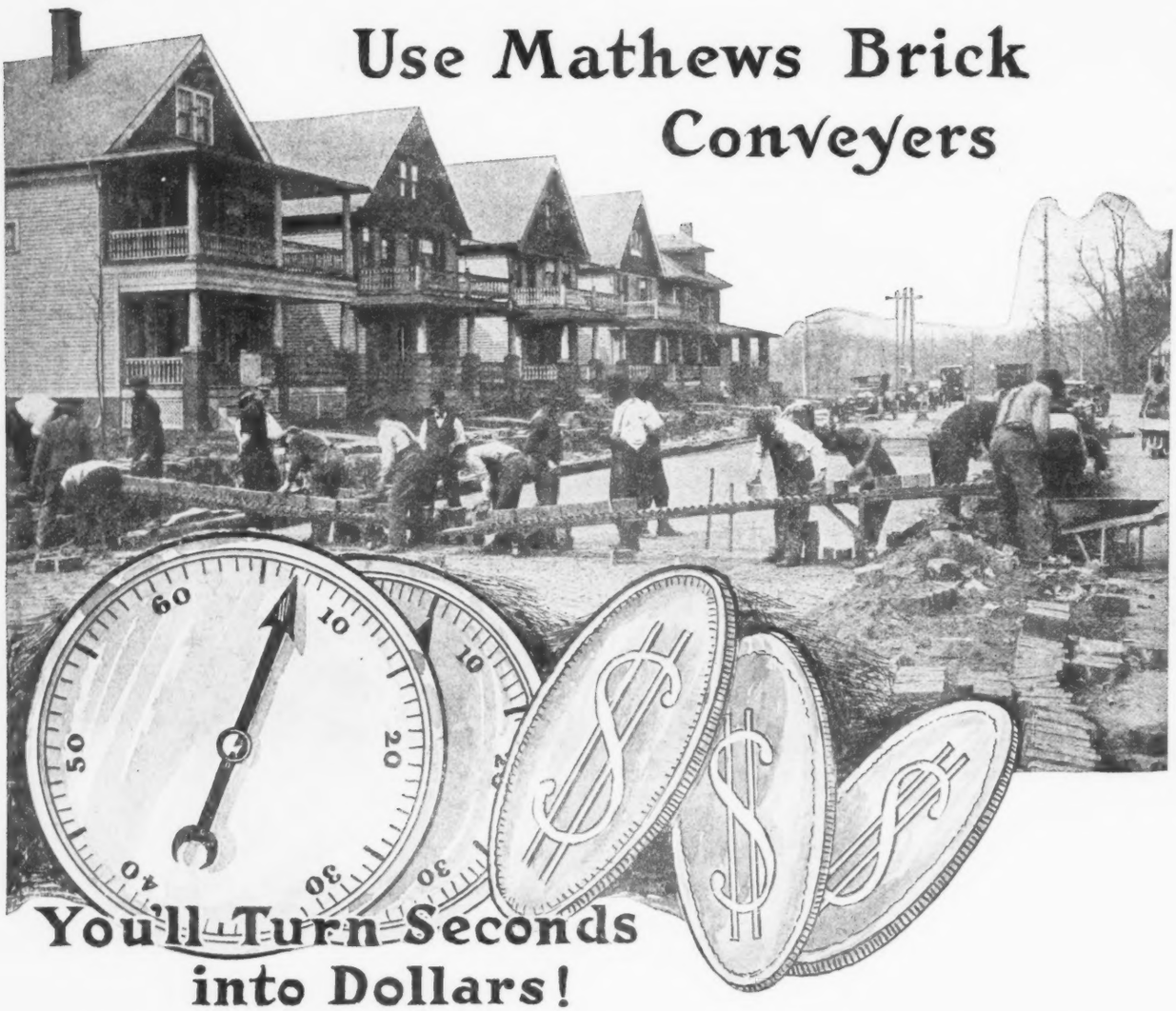
Use Mathews Brick Conveyers



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Municipal Journal

Volume XLII NEW YORK, JANUARY 4, 1917 No. 1

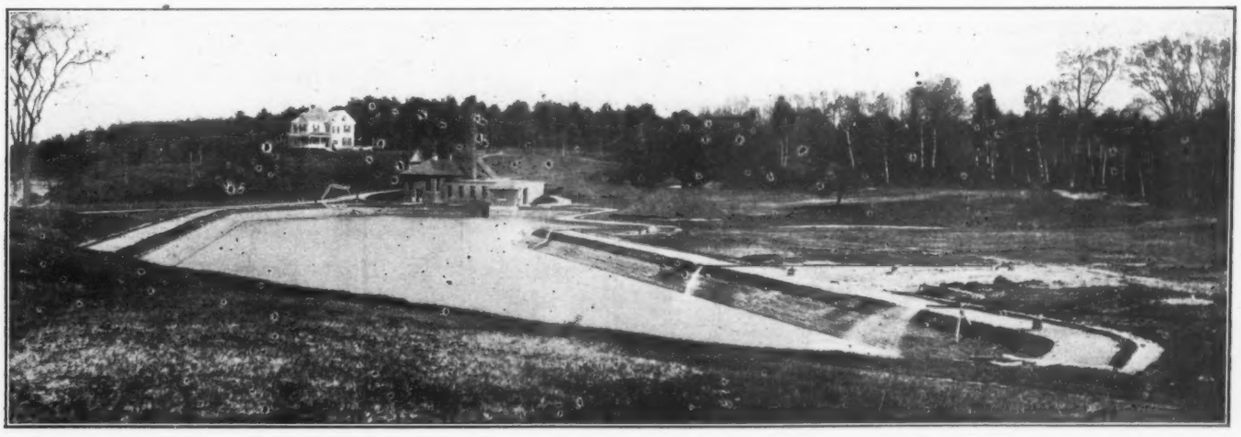
PUMPING WITH THE AIR LIFT

Theory of Operation—Development of the Apparatus—Differences in Details—Illustration of Use—Some General Principles—Double Pumping by Use of a Booster—Examples of Use.

By J. F. SPRINGER.

Forty per cent or more of the public water works of the country draw their supplies from wells; and in a large percentage of the cases pumping is required to bring the water to the surface of the ground, at least in the quantities desired. The method of lifting and appliances used are therefore matters of considerable importance.

Among the systems employed is the air lift. Briefly stated, this consists in mixing air with water in the bottom of an immersed tube. The specic gravity of the mixture will be much less than that of ordinary water. Consequently, it will rise in the tube. The mingling of the air with the water may be carried on continuously. In such case, there will be a continuous flow of the mixture up the pipe. Naturally, the bubbles at the bottom of the tube will consist of compressed air. These will continually expand as the mixture rises and the surrounding pressure decreases. When the mixture reaches the open, the air bubbles will rise to the surface and escape.



RESERVOIR OF NEWBURYPORT WATER WORKS.
Water from three wells is to be seen entering the reservoir. Air is furnished to wells from power house at further end of lake.

In addition to causing the water to rise, the intermingling of the air with the water, lasting as it does for a considerable interval, secures a considerable aeration of the water, which is always an advantage, and in some cases almost essential, as in the removal of iron carried in suspension.

An air lift plant consists of several distinct parts: (1) The compressor, (2) the engine and accessories, (3) the air tank, (4) piping, (5) water tank. As one plant may very properly include more than one well, the piping may be fairly extensive. There may be as many points of discharge as there are wells. The wells may be operated together or singly or in any combination desired. One compressor and air tank will serve for all the wells of a group, but of course the compressor capacity will have to be at least equal to the maximum demand for air.

The piping system may extend for a considerable distance from the air tank. It is understood that a surface area as large as 10 square miles and a pipe line as long as 40 miles may be made dependent upon a single central plant. There is loss in transmission, of course, as there is in every other system for the transmission of power. In the case of compressed air, the loss may be taken as roughly proportional to the length of the pipe. Thus, in a 6-mile transmission, we should have double the loss occurring in a 3-mile line. Long transmissions are unobjectionable from the point of view of the cost of labor for operation, since the actual pumping is automatic.

The height of the lift which is practicable seems to be unlimited. There are one or more instances of a 1,200-foot lift. There must, however, be suitable conditions, principally centered on the depth of submergence; but high lifts are not complicated by long metal parts which have to be set in motion, such as piston rods and the like. When the down-going air-supply pipe and the up-going water pipe have once been properly installed, there is nothing more. There are in the well no moving parts to break or get out of order. Depth of submergence is about the only limit to the height of lift. It is the pressure per square inch due to the weight of the surrounding water that drives the mixture of air and water

up the water pipe. This pressure must be sufficient to cover the losses as well as balance the column of mixed air and water.

By "submergence" is meant the distance measured vertically from the top of the ordinary (non-aerated) water in the well (when the air lift is in operation) down to the point at which compressed air is discharged. The total air-lift column is estimated vertically from the same point of discharge upwards to the point where the mingled water and air is discharged. The ratio of submergence to this latter distance is, when expressed as per cent, the *percentage of submergence*. The depth of the well is not used in this calculation; nor is the depth of the water level below the ground surface, for when operation begins, the level of the water in the well will drop. The percentage of submergence may in practice vary from 30 to 75 per cent, both of which are extremes and are not to be regarded as approved practice.

At Plainfield, N. J., is an air lift system operated by the Plainfield Union Water Company. Eight wells varying in depth from 300 to 400 feet were connected to a single central plant. From the main air tank ran main air supply lines of 4-inch and 6-inch diameters. The wells themselves were on 2-inch lines connecting with the mains. The total air lift column varied from 203 to 217 feet; while the depth of submergence ranged from 110 to 124 feet. The percentage of submergence varied from 53½ to 61. The average percentage of submergence was nearly 57. We may regard this figure as approximately the proper one for good working conditions for wells having a moderate lift.

In order to understand clearly certain marked advantages of the air lift, it is necessary to understand the arrangements for mixing the air with the water down in the well. The oldest system is shown representatively in Fig. 1. Apparently, this was the invention of Dr. Julius G. Pohle and dates back a quarter of a century. The water tube is large in diameter and is set eccentrically in the well casing to permit the installation of the down-going air pipe. The water pipe is open at the lower end. Just a little above the bottom edge the air supply pipe turns sharply and makes junction with the water tube. The air rushes in from the side and mixes with the water. This is the "side inlet system" or the Pohlé system. It is exceedingly simple. There is a complete absence of working parts—nothing to watch, nothing to care for or renew from time to time. This system has stood the test of extensive use. However, improvements have been made in it.

In Fig. 2 we have a development of the foregoing system. Here, the foot of the water pipe is completely surrounded by an enlargement of the air pipe, thus creating an annular ring of down-going air of varying width. The air pipe is continued below the foot of the water pipe, quickly drawing in to the diameter of that pipe. In effect, the water pipe is interrupted for a short distance and the air is supplied at this point around the entire circumference. This system is in use today under special conditions, but for most cases a further development of the annular air supply seems to be preferred. A 10-inch well equipped with a 5-inch discharge pipe and the annular foot-peice shown in Fig. 2 and an air tube of 1½-inch size may be considered as having a capacity of some 300 gallons per minute.

In Fig. 3 is shown another type of annular air feed. Here the casing of the well is used as the air tube, the air entering at the top of the annular space between the casing and the water tube. The mixture of air and water enters through the open bottom of the water tube. This system is now used little, if at all, except in connection with salt wells.

In Fig. 4 we have a marked change. Here the casing is the water tube. The air is carried down by means of a centrally arranged pipe. It is understood that this system was especially devised for the purpose of getting the maximum output possible with a given size of casing. It has, however, been improved upon.

In Figs. 5 and 6 we have two modern types. One is an improved form of the system which employs an annular ring of air; the other, a further development of the central air tube idea. In Fig. 5 the annular ring begins rather high up and ends before the bottom of the water

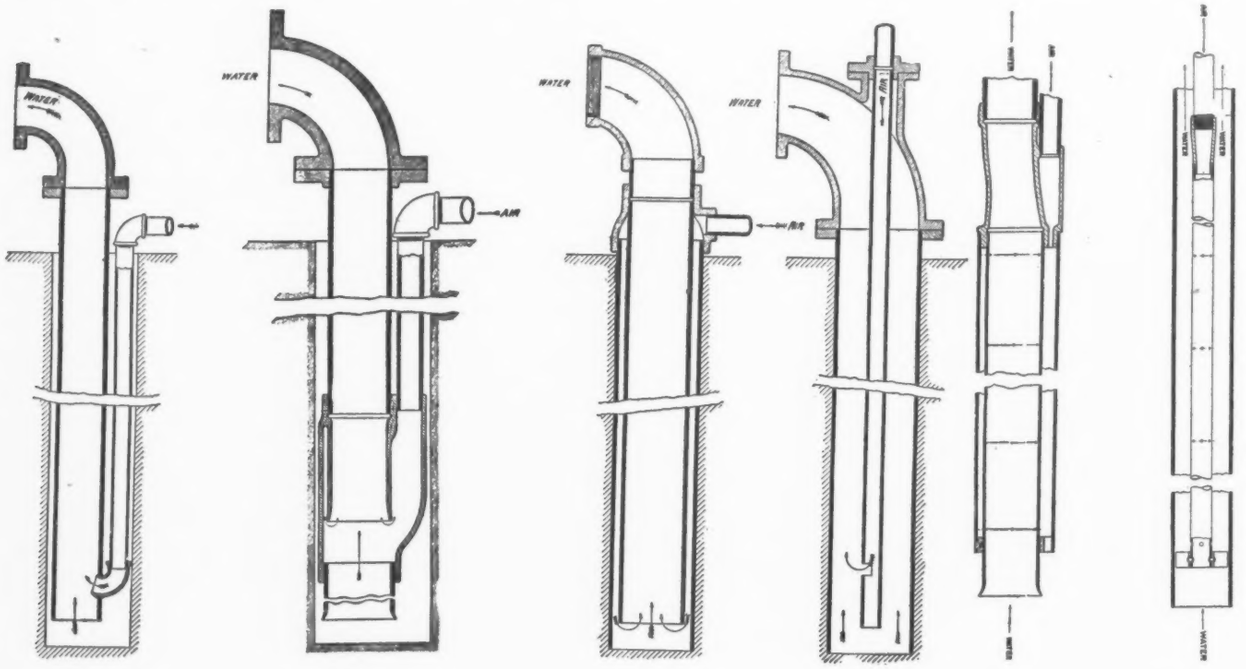
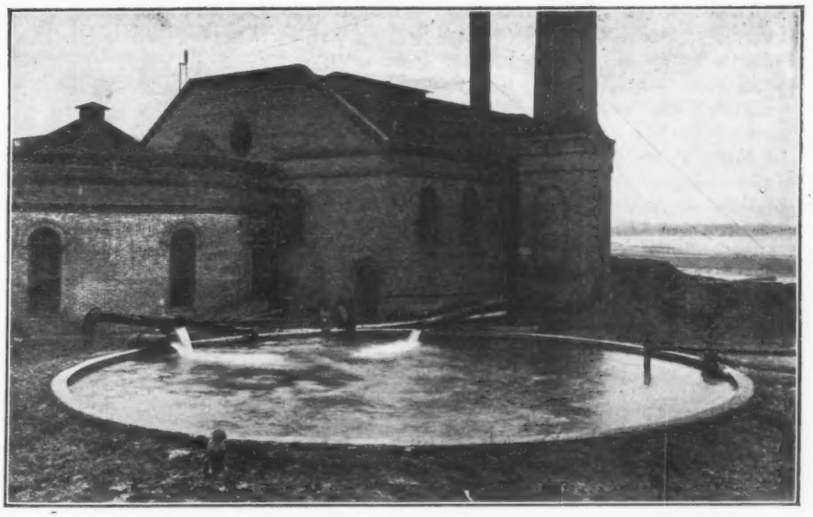


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6.

METHODS OF PIPING WELLS FOR AIR LIFT.

tube is reached. The inner tube, which forms the inner wall of the annular air space, is of brass, and is perforated at intervals with rings of holes spaced in such a way as to create sufficient back pressure in the pump to prevent slippage losses and to give control over the admission of air to the upgoing column of mingled air and water. The discharge pipe is of smaller diameter than this perforated brass tube, a tapered connection being used to join the two. This arrangement results in an acceleration of the upward movement at the top of the column. It will be noted that the air is supplied in small streams, which is found to promote the formation of small separated bubbles of air.

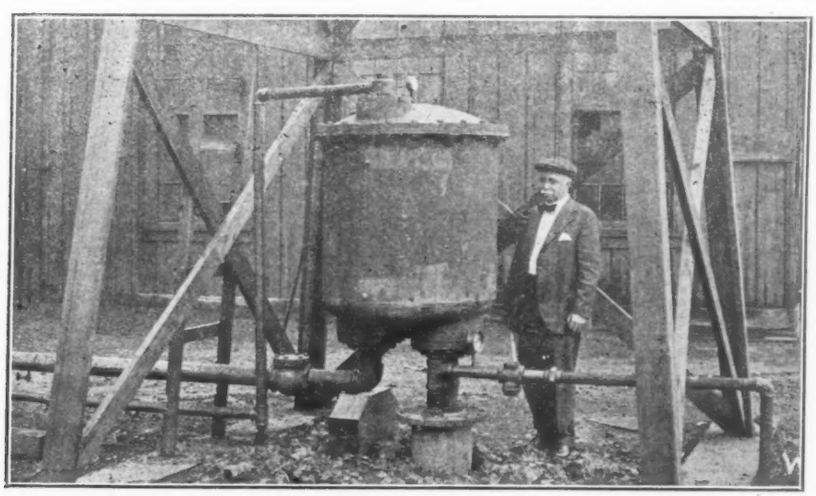


WELLS, POWER HOUSE AND BASIN OF PINE BLUFF, ARK., WATER WORKS.

In Figure 6 the air supply pipe in the center is, for a longer or shorter distance, a brass tube with rings of small perforations. These facilitate the formation of a proper mixture of air and water in the annular space between the brass tube and the well casing. The lower end of the brass tube is left open, thus providing for the free escape downwards by gravity of any scale or dirt carried in by the air.

A 10-inch exterior pipe supplied by a 1½-inch air pipe may, under the system of Fig. 5, be made to discharge through a 5-inch discharge pipe from 300 to 500 gallons per minute, as conditions are more or less favorable. A 10-inch casing under the system represented in Fig. 6, supplied by a 2½-inch air pipe, may be made to discharge from 1,300 to 2,200 gallons per minute. It would appear that this system which uses a water discharge of the same diameter as the casing is well adapted to secure the utmost capacity with a given size of bore hole.

One of the difficulties of air lift operation is that the column of mixed air and water is not readily diverted to a discharge point located elsewhere than immediately over the head of the well. The tension of the air at the moment of discharge into the water in the well is equal or superior to the pressure of the surrounding water. As the bubbles of compressed air rise, they naturally expand with the falling pressure, but when they reach the level of the ground they may still be subjected to more than atmospheric pressure. Such air bubbles have value at this stage, and if the stream of water be passed through a suitable vessel they may be collected into a single mass. This gives a cushion of air exerting pressure against a body of water, which pressure may be utilized to drive the water horizontally or vertically. In fact, we have substantially the water tank of the well-known pneumatic system of water supply that is used as a substitute for the elevated tank and stand pipe. In connection with the air lift, this apparatus is a "booster." The work to be done by the booster, represented by the lift and friction head, should not exceed 25 per cent of the total working air pressure of the air lift pump. The size of the air cushion naturally depends upon the level of the water in the booster tank. An air valve is so arranged that the rise of the water tends to close it. The incoming water from the well thus operates to build up pressure in the air cushion. When the water level goes down, the valve opens and allows more or less air to escape. All this goes on automatically. The escaping air may be discharged into the open, or it may be conducted to the intake side of the air compressor. In the latter case care should be taken to dry the air before permitting it to pass into the compressor itself.



BOOSTER TANK (SULLIVAN AIR LIFT) FOR COMPRESSED AIR LIFT PUMPING AT FORT WORTH, TEXAS.

It will be noted that the booster, which acts automatically, may make it possible to do without low-lift pumping equipment that would otherwise be required. The booster may be set in a concrete box located for the most part below the ground level. It should be set directly over the well, so as to avoid deviations from the vertical of the upcoming stream of mixed water and air.

Two general principles have now been pretty well ascertained:

(1) "As the lift increases, the necessary ratio of submergence to lift decreases."

(2) "For a given lift and quantity of water, the necessary size of discharge pipe increases as the submergence decreases."

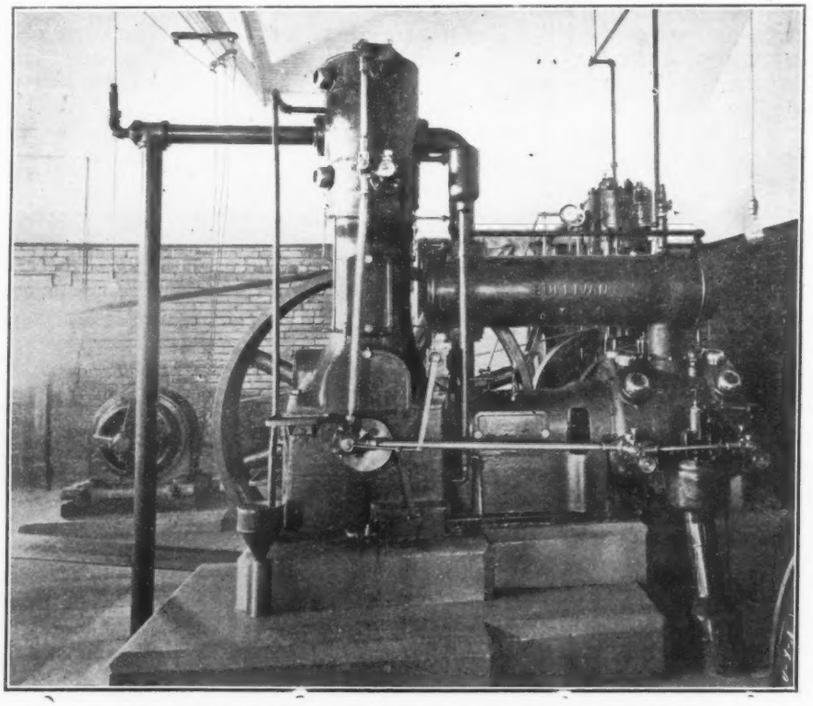
In extensive experiments carried on by the Westinghouse Air-Brake Company with a well having a diameter of 6 inches and a depth of 174 feet, it was found that the least pressure

that would give a continuous flow of water was the one to use. If the pressure is only a little lower, the flow becomes irregular and the total amount delivered in a given time is decreased, although the amount of air consumed per gallon of water pumped is somewhat less. It would seem from this that if it is not necessary to use the pump to capacity we may economize a little on the air by maintaining the pressure just below that which produces a continuous flow. If an air pressure higher than that necessary for uninterrupted flow is employed, the capacity is increased but with less economy of air per gallon of water. The pressure may be increased to a point where the flow is at its maximum. If we go beyond this pressure, the flow is decreased. The sound of the discharge is a reliable guide to proper regulation of the air supply.

If the ratio of submergence to lift is maintained without change, we may vary the lift without varying the rate of delivery or the air consumption per gallon of water. It is understood here that the pipe is kept the same as to size. If, however, we increase the size of the discharge pipe we shall be able to economize on air.

When beginning to pump, the air should be admitted gradually. For a short time nothing will happen. Then the water will start to flow with a rush; a lull will follow, and then a more uniform delivery will begin. Then the valve should be opened slowly until a continuous flow has been secured.

At Pawtucket, R. I., is a large manufacturing concern which consumes a very large quantity of water. In former times it drew its supply from a pond or lake. This supply proved to be insufficient to satisfy the concern's requirements, and seventeen wells were put down to depths varying from 117 to 300 feet. (One well seems to have gone dry, leaving 16 to furnish the supply.) The level of the water in these wells varies from time to time; but it is understood to be, on the average, about 100 feet below the surface of the ground. Air lift pipes were put down into the several wells, the ratio of submergence to the total depth to foot of pipe being about 60 per cent. The steam-air plant consists of steam driven, two-stage apparatus having both steam and air cylinders compounded. The steam cylinders are 18 and 30 inches in diameter, the air cylinders 16¼ and 27¼ inches. The stroke is 24 inches. Between the air cylinders, but above them, is arranged an intercooler. At 106 revolutions a minute, the amount of air theoretically compressed to 70 pounds pressure totals 1,600 cubic feet per minute. Operating at 125 pounds steam pressure, vacuum at 26 inches mercury, with dry saturated steam, the energy is rated at 230 horse-power. A single Bigelow boiler of 260 h. p. supplies the necessary steam at 130 pounds pressure. The compressed air flows through an 8-inch pipe to a cylindrical air receiver lying flat upon the ground, which has capacity of about 275 cubic feet. The air is used at about 75 pounds pressure for normal operation. When starting up, however, a higher pressure—90 or 100 pounds—is needed. The air from this receiver is not all consumed by the operation of the wells. There is a 2-inch main which runs into the factory and supplies air for various purposes. A 6-inch wrought iron main supplies the wells, which are several hundred feet away. A principal valve on the air man controls the supply for the group of wells regarded as a unit. A short length of pipe, set up vertical, is arranged to protect the valve and at the same time act as a kind of supplementary air receiver of small size. The individual wells are supplied by branch pipes of 1¼-inch size. The water pipes in the wells vary in size from 2 to 4¼ inches because of the varying capacities of the wells. This plant is understood to have pumped 2,000,000 gallons in 11 hours, or 3,030 gallons per minute. A rough calculation gives 33 per cent as the efficiency of the system as a whole.



AIR COMPRESSOR, DICKINSON, N. D., WATER WORKS.
A 628-ft. belt-driven, angle-compound Sullivan Compressor.

SOME DAYTON PAVING DETAILS.

By T. J. WILSON.

In connection with an extensive amount of street paving which is being done by the city of Dayton, Ohio, city engineer Fred Eichelberg and city manager Waite have introduced a number of interesting features which are out of the ordinary. The widest roadway in the city, Main street, has been paved with wood block, and is just receiving its finishing touches; the same material having been used for several other streets during the year. In laying the block, a dry mixture of cement and sand was used for a cushion, laid 1½ inches thick. The joints were filled with pitch. As Main street carries the concentrated street car traffic from six different routes, it was necessary during the paving to re-route these lines temporarily. The wood blocks were furnished by the Republic Creosoting Company. Other streets in the city were paved with brick.

A novel feature of the Main street paving was the use made of Durax stone blocks. These blocks were used for paving spaces between the rails of the street railway, and one of the citizens, noting the striking contrast between the white of the granite and the dark color of the wood blocks, suggested that the blocks be used in the wood pavement for marking safety zones, in place of the white lines painted on the street, which were rapidly removed by rain and traffic and frequently hidden from view by dust, or the standards and signs placed on the roadway

to indicate safety zone but which had some objectionable features. This suggestion was considered favorably by the officials and was adopted, and in laying the wood block pavement the safety zone was paved with Durax blocks, and the idea seems to have proved to be a good one. This is believed to be the first instance of the employment of this plan.

Another feature which has previously been employed on country highway work, and in a few instances on street work, has been quite generally adopted in Dayton in connection with all kinds of public work, not only paving, but sewers and other work of any importance. This is the placing, adjacent to each piece of work, of a standard carrying a sign which gives information concerning such work. As an illustration, one of these reads:

Main Street Paving
Under million dollar bond issue.
Material—wood block and granite.
Amount—20,580 sq. yds. wood block, 6,250 sq. yds. granite.
Cost—$92,110.
Contractor—Edward Ryan.

This plan of giving the widest publicity to information of this kind concerning public work is but one illustration of the general idea that pervades the entire administration of public affairs by the city manager, viz., to give the widest and fullest publicity possible to all such affairs.

MAKING A TOWN SURVEY

Advantages of Having a Precise Survey of a Town or City—Party Employed in Making Survey—Instrumental Work—Setting Monuments—Plotting Final Record Maps—Cost of Survey.

By EDGAR S. CLOSSON, M. Am. Soc. C. E.*

During the year 1912 two citizens of Montclair, N. J., Henry C. Meyer and John M. Goodell, persuaded that certain changes were desirable in that town in connection with the existing practice of securing engineering services, studied the engineering organizations of a number of other towns and cities, including Newton and Brookline, Mass., which are noted for the excellence of their public works. Utilizing the information thus obtained, they made a report to the town council embodying certain recommendations. This report made certain statements and recommendations, of which the following is an abstract:

Montclair, which had in 1912 a population of about 23,000, occupies a territory of about seven square miles on the easterly slope of the Orange mountains. Although it contains seventy odd miles of streets and sewers, "it has in its employ under the title of town supervisor, a civil engineer who, having no engineering assistants, is required to perform the duties of a superintendent of streets and various other duties which make it impossible for him to give the needed attention to the pressing engineering problems of the town. What surveying is required by the town is done by private surveyors, whose records remain their personal property." The town owned practically no records such as a modern municipal engineering department should possess, the best thing in this line being a sewer map which the town supervisor had compiled from such very poor records as he was able to find, supplemented with information gathered by personal investigation. "The town must sooner or later put its engineering work on a businesslike basis, and the sooner this is done the less expense will be required for the essential preliminaries. The location of the town on a steep mountain side makes it particularly desirable to get together the fundamental engineering data needed for well-planned public works at the earliest practicable date, because the proper planning for improvements in a district with such topographical features is much more troublesome than where the territory is more nearly level. This is particularly true with respect to the engineering features of surface drainage and road betterments.

"The town is handicapped in its engineering work at all times under existing conditions because of its lack of any accurate map of its territory. If it were to engage a consulting engineer to design a surface drainage system, for instance, he would require a proper map; if the services of such a specialist were engaged to lay out a system of water mains, a map would be required; the same is true if a specialist were retained to report on the street improvement work. For this reason it may be stated that the greatest need of the town is a good map as the basis for its engineering work. Under the present organization the town supervisor has no staff and no money to make the surveys for such a map and to carry out the drafting work. If the work were let to a private surveyor all the records of it would be his private property, and there would be little assurance that the work would be done with enough detail to make it useful at all times."

It was pointed out that drainage systems might be laid out with little difficulty in each of two sections of the town, which were then separated by a district only partly settled, and would answer well for a number of years; but as the intervening territory developed the drainage works of the two districts would be extended until they met, and it would then probably be found that, because a general plan for the entire town had not been made, difficulties would arise in connecting the two systems, probably involving expensive relief drains and intercepting sewers. In order to prepare such a general drainage plan the designing engineer must have full topographical data regarding the town.

"The surveys and drafting needed to compile a reliable map will not prove expensive if the work is done as a part of the duties of a well-organized town engineering department. It will first be necessary to ascertain the points in the town and its immediate vicinity which have been definitely located by the United States Coast and Geodedic Survey and the United States Geological Survey. These points will be the fundamental reference points to which the location of all other points in the town can be referred. From these basic points others will be located by precise methods of measurement which will give sufficient points distributed through the town to enable the surveying of the streets to be done easily and with the greatest accuracy needed for such work. The surveying of street lines does not require so much accuracy as the location of the basic points about the city which serve as starting points for the street surveys. This system of preparing a map concentrates the more tedious and accurate work on the features where it is unavoidable and permits the ordinary surveying work to to be prosecuted with the utmost economy consistent with desired results."

*Town engineer of Montclair, N. J.

It was recommended that a town engineering department be established, the town engineer making all surveys required by the town, keeping all surveying and engineering records and maps, making plans and specifications for any new work that may be ordered by council and supervising the execution of such work; and generally furnishing such engineering services as the town government may desire.

Acting upon this advice, the town council in 1913 appointed the writer as engineer of the town, with instructions to organize a town engineering department. The work coming under the supervision of the town engineer in Montclair is more comprehensive than in most municipalities, since here the engineer has charge of the collection of ashes and garbage, of the repair and maintenance of all roads, pavements and storm and sanitary sewers, of street cleaning, etc., all of which work is done by town labor hired by the engineer, who must also purchase the necessary materials and supervise the details of the work. The engineer has charge of all town engineering, including the supervision of all local improvements, and in addition, during 1914, was given charge of the special engineering work of making a complete survey of the town. As the situation which confronted Montclair now exists in many municipalities throughout the country, the solution of whose problems must sooner or later receive attention, the subject of the town survey in Montclair should be of special interest to many having to do with municipal affairs.

Montclair is a mountainside municipality of 26,000 inhabitants, having an average length north and south of five miles and an average width east and west of one and one-half miles. The topography is rugged and varies in elevation from 140 to 660 feet mean above sea level. Eighty-five miles of streets now exist, which for the greater part are not improved with curbs.

Under the old condition it often happened that private surveyors disagreed on street lines and grades, resulting in failure of different improvements such as curbs and sidewalks to join when staked out by different men.

The tax maps of the town were inaccurate and were finally rejected by the State Board of Equalization of Taxes and are being used temporarily only under the stipulation that the survey of the town proceed and that an entirely new set of maps be made when it is completed.

The location of the west boundary line of Montclair has long been the subject of more or less dispute, and the other boundaries, while not disputed, were very poorly and insufficiently marked.

The organization for the work under the supervision of the town engineer has been as follows:

FIELD PARTY.

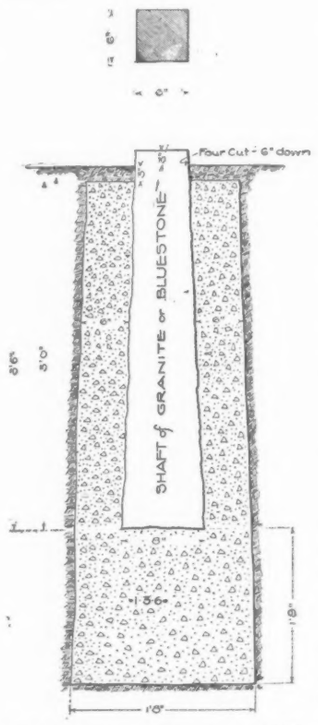
1 Assistant engineer	@	$1,500
1 Transitman	@	1,080
1 Rodman	@	900
1 Chainman	@	720

OFFICE.

1 Draftsman	@	1,500

This organization has been very closely followed and later in the work an additional man at $750 per annum has been used to assist the draftsman on computations and maps, while at other times the transitman has been omitted from the field party. It has been necessary in emergencies to use a portion of this organization on other town work.

The first work done was to establish the true meridian by well-known methods by night observations on Polaris. For the purpose a base line was chosen, one point of which was on the east boundary line, and the other end was a variable point to be determined by the observations. The variable point was chosen as far away as clear and distinct readings could be obtained after repeated trials. This variable point was finally located and marked on a permanently set scale which the writer had used on accurate check surveys for the alignment of the Battery-Joralemon street East river tunnels, New York City. The scale was ten inches long, graduated in inches and tenths of inches. Observations were taken on many different nights and the mean of accepted readings taken for the result.



STANDARD STREET MONUMENT.

Two bags cement, 6 cu. ft. sand; 2 cu. ft. stone. The boundary monuments were made in the same way, but were set 12 inches higher above the ground.

After establishing the base line with its bearing, the boundary lines of the town were surveyed. For this purpose the town was divided into three nearly equal quadrangles, which gave well conditioned figures. Quadrangles A and C were balanced with an error of closure of 1 in 10,000, B with 1 in 50,000, since this contained the business section and most valuable property in the town. In each quadrangle random intermediate lines were run and any apparent errors segregated and corrected. The monuments on boundaries were set at all street intersections and at other sufficient intervals so as to have in general a maximum distance between any two monuments of 1,000 lineal feet or at such intervals as would allow clear sights between any two monuments.

It is interesting to note that, while the east boundary line, about five miles long, is described and recorded as a straight line throughout, the present survey shows the line, as surveyed in 1892 and marked at that time by monuments, to contain errors of alignment as great as three feet and in length as great as 8.8 feet.

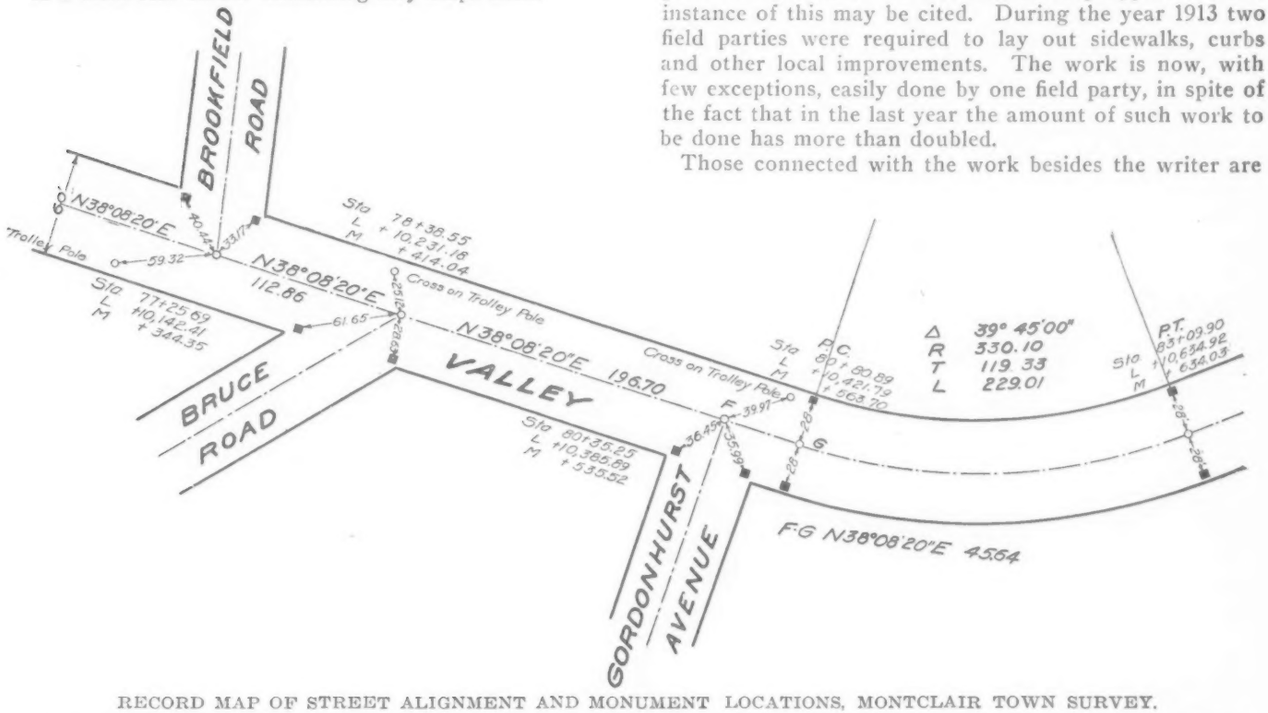
The boundary line was followed by surveys of streets and setting monuments to define their limits. The rule followed on the street monuments is to set the monuments a standard offset of two feet toward the street from the property lines at every angle in the line; at P. C.'s and P. T.'s of curves, and at all four corners of street intersections. The field parties were given instructions to obtain two sets of readings for each angle, each set of readings to consist of three readings added on the plate direct and three reverse, the first reading and sum of the angles in each case to be recorded. Readings taken in this way and varying over thirty seconds were to be discarded and the operation repeated until two sets of uniform readings were obtained. On street work the error of closure was limited to 1 in 5,000, but the results obtained are much better than that minimum limit. The accompanying sketch shows the standard street monument and method of setting.

All chaining was done with an ordinary 100 foot steel tape using a spring balance to obtain proper tension, and corrections were made in all cases for temperature. In

cases where the topography was especially rugged, chaining was done by slope measurements over tripods, the elevation of the ends of the chain simultaneously recorded by a level party and the slope measurements reduced in the office from tables.

It is intended to use the street monuments also as a system of bench marks throughout the town. The work of establishing bench marks referred to mean high water level at Newark has been completed and these benches are to be transferred to monuments and are to form the basic points from which to make the topographical survey of the town.

The work of placing the results of the town survey on final record maps is well advanced. A sample of such record maps is submitted herewith. These maps are all drawn on sheets of standard size, 36 by 22 inches, and are on muslin backed paper perforated so as to be bound in a loose leaf binder containing fifty maps each.



RECORD MAP OF STREET ALIGNMENT AND MONUMENT LOCATIONS, MONTCLAIR TOWN SURVEY.

The work of searching records and assembling all data available has been in itself no small task. The town at the beginning of the work was practically bare of street records. A systematic search was made through the town clerk's files of old deeds and road books, the board of assessors' maps of street openings, the records in the county clerk's office and all laws affecting street lines or boundaries. Copies of all such information were made and filed. In addition the town acquired through purchase the complete street records of the office of James Owen, an engineer formerly in private practice in the town and whose records and tie points for the streets of the town were undoubtedly the oldest available and which in many cases checked information derived from other sources. Their use has been of great value in determining points when no other records could be found. In other instances the old marks referred to were entirely obliterated and the ties could be used only as an indication of the location which had to be verified by other data. All data for each street in the town and each boundary have been carefully indexed and filed in separate folders, in vertical steel filing cases placed in fireproof vaults. In this way a detailed history, complete as possible, of each street is always available for instant reference. This file is now kept up to date in regard to any change in grade or alignment of an existing street. The town now has on file 3,000 maps of streets and boundaries made or acquired in connection with the town survey during the last three years.

At the present time it is estimated that the whole work is about two-thirds complete and has cost the town to November 1, 1916, exclusive of any portion of the town engineer's salary, but including labor and materials used in setting monument stones, $15,801.72. Of this amount $10,132.70 was expended for engineering salaries, instruments and office supplies, $900 for the records of the former town surveyor, and $4,769.02 represents the cost of labor and materials used in setting monuments. It is estimated that $10,000 will be required to complete the work if the same organization is maintained.

Although the work of the town survey is still incomplete the benefits of the work are already apparent. One instance of this may be cited. During the year 1913 two field parties were required to lay out sidewalks, curbs and other local improvements. The work is now, with few exceptions, easily done by one field party, in spite of the fact that in the last year the amount of such work to be done has more than doubled.

Those connected with the work besides the writer are Crosby J. McGiffert, assistant town engineer, and E. N. Peterson, assistant engineer, who is now in direct charge of the field and office work.

LOCATING MAIL BOXES.

Some of the papers in New York City have been investigating and reporting upon the method of location of letter boxes throughout that city, and the subject has also been taken up by a committee of the Women's Municipal League. The work of the latter included a canvass of the territory from 59th to 119th Sts. and from Central Park West to the Hudson river. The committee found the locations of the boxes to be very poor, in their estimation, and suggested a relocating of them in accordance with the following principles:

1. That as nearly as practicable the letter boxes should be distributed so as to be equally accessible to the residents on each block.
2. That no letter boxes should remain on gas stumps, but should be placed on electric light standards.
3. That letter boxes should always be placed at the intersections of the streets and not in the middle of the blocks so as to be available for residents of both avenues and streets.
4. That there should be no increase in the total number

of letter boxes, so as to encumber the Post Office Department.

In applying these principles a consideration should be had of the number and location of mail chutes throughout a given district and also of the quantity of mail collected from the boxes at each point. The committee believes that the present style of box is altogether too large and also that it is offensive to good taste in its appearance.

STONE AND CONCRETE PAVEMENT FOUNDATIONS*

Conditions Under Which Each Will Give Good Results—Rolling Base on Sand Fill—Various Concrete Foundations.

The determination of what kind of pavement foundation is best for any particular conditions necessarily entails a careful study and consideration of those conditions in each case, particularly the character of sub-soil, of traffic and of the wearing surface to be laid on the foundation and the climatic conditions. Fifteen years ago the instructions or advice given by Warren Brothers Company with reference to foundations was:

> An unyielding foundation is essential. Our specifications for bituminous base (Form B) are designed for characters of sub-soil which can be rolled to provide a firm foundation. Where unyielding sub-soil conditions do not exist, or where the roadway is so narrow or contains such obstructions as to make proper rolling of foundation impossible, the use of hydraulic concrete (Form C Specifications) is recommended, being very careful that the concrete is roughened as specified.

Mr. Warren says that since that time he has seen nothing to indicate that this opinion is not still absolutely correct, except as noted below in the case of sandy subsoil.

The writer believes that it is pretty generally recognized that all forms of block pavement must be laid on concrete base, for the reason that a broken stone base does not provide a bed on which the blocks can rest without danger of rocking under traffic. He also believes that, unless the blocks are more completely and firmly grouted than is practicable on the entire area of a pavement, it is necessary that the depth of concrete foundation be greater than the foundation for a monolithic wearing surface, because in the case of block pavement the weight transmitted to the foundation is that resting on individual block areas, while in the case of monolithic surfaces the weight of the same load on the surface is distributed over a much greater area of foundation. He therefore considers that a choice between broken stone and concrete foundations is limited to monolithic wearing surfaces.

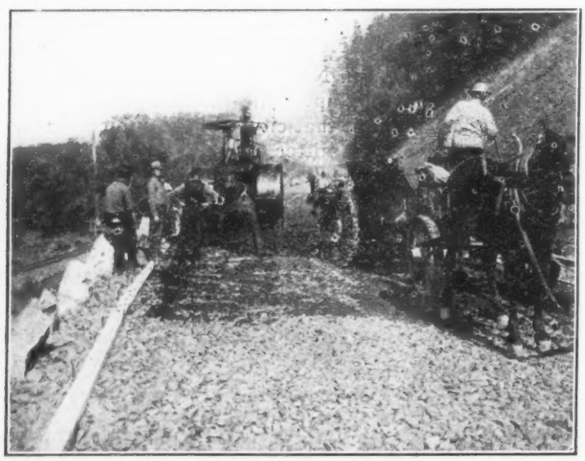
"If the sub-soil is of the nature of clay and the climate is such that the sub-base is liable to become wet before the water-proof pavement surface is laid, then it is unsafe to specify broken stone base, because in such wet, yielding condition the sub-soil does not provide a sub-grade over which either the crushed stone or bituminous surface can be properly compressed.

"If, on the other hand, the sub-soil is of a gravelly nature or if in a climate where it seldom or never rains during the working season, no more serviceable or equally low cost foundation can be produced for a stable bituminous wearing surface than a thoroughly rolled crushed stone." The author cites two instances where such base was used to advantage, one in El Paso, Tex., where the sub-soil is what is known as "caliche," a sort of clay-bonded gravel, but is sometimes gravel without the clay or clay without gravel, in which city during the past ten years, his company has laid 586,000 square yards of pavement on a rolled broken stone base. In Portland, Ore., the soil is generally clay or loamy clay, but in some cases gravel, and here 2,773,500 square yards of pavement have been laid on broken stone base during the past twelve years. In both cities there is comparatively dry weather during the construction season, so that the sub-grade, once rolled solid, remains so throughout the process of construction, and the results have been the equal of those on a concrete base.

SAND FILL ON PACIFIC HIGHWAY BETWEEN PORTLAND, ORE., AND VANCOUVER, WASH.
This fill is 42 ft. wide from shoulder to shoulder, with 2 to 1 side slope. The length of the fills is 18,675 ft. and the average height 22 ft. The total volume of fills is 1,444,000 cu. yds.

Compacting a broken stone base on a sand sub-grade is extremely difficult if the sand is dry. Some years ago the author obtained satisfactory results by spreading marsh grass over a sandy sub-grade before spreading crushed stone, thus preventing the stone from working down into the sand. During 1916, 46,320 square yards of pavement were laid near Portland, Ore., on broken stone base on a sub-grade of sand pumped from the Columbia river to make a fill varying from five feet to twenty-five feet in depth. It was anticipated that during rolling the broken stone would be forced several inches into the sand, which even then would not be solidly compacted. It was found, however, that by using a generous amount of water to wet the sand during rolling, the sand would present a solid foundation on which stone could be satisfactorily compacted by a 12-ton steam roller. The cause and effect were undoubtedly similar to those noticed on a sandy beach, which can hardly be traversed by the light-

*Abstract of a paper before the American Association for the Advancement of Science, by George C. Warren.



SPREADING AND ROLLING WEARING SURFACE ON BROKEN STONE FOUNDATION.
Warrenite on Columbia River Highway.

est vehicle when dry but will sustain a heavy load when containing just enough water to fill the voids.

Use of broken stone base is especially applicable where the pavement is to be laid on an old macadam road or street, the grade and contour of which are such that they can be regulated without serious disturbance of the old macadam. (Illustrations of this were given in Municipal Journal for October 5, 1916, pages 420 and 421.)

If the pavement surfaces be water-proof, a rolled crushed stone base does not suffer the cracking found in Portland cement concrete. Also, there is the advantage that the bituminous wearing surface under the pressure of the roller makes a more thorough union with the foundation than is practicable in the long run with either portland cement concrete or silicate of soda concrete foundations.

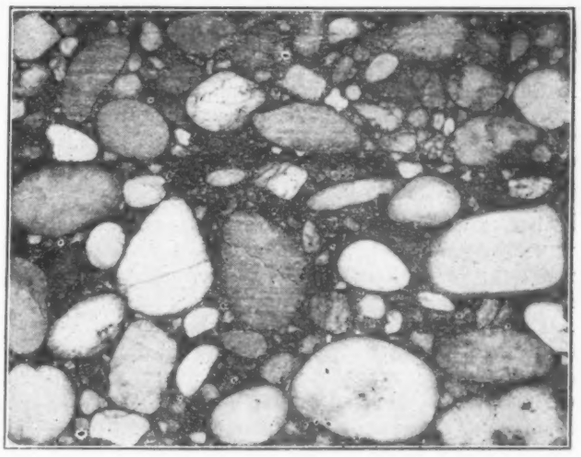
Concrete foundations the author divides into three classes—portland cement concrete, bituminous cement concrete and concrete bound together by other classes of cement; the concrete consisting of a dense mass composed of a mixture of coarse and fine aggregate, approximately one-half to two-thirds of the total being coarse aggregate. With a less amount of coarse aggregate the product is mortar with or without a small percentage of coarse aggregate "floating" in a surplus of mortar. The advantage of concrete is that, in the case of a weak sub-base, it bridges over the weak spots. Taking the sub-soil conditions throughout the United States and Canada as a whole, in a large proportion of cases the sub-soil and climatic conditions are such as to make the use of concrete desirable, but, as noted above, this is not at all a universal rule.

It is well established that a slab of portland cement concrete laid on more or less damp sub-soil will necessarily crack and that cracks in the wearing surface above are sure to follow. In many cases, however, this cracking is the lesser of the two evils.

Bituminous concrete in which bituminous cement takes the place of portland cement possesses the extremely important advantage of not cracking in the way just described. It also has the advantage, which is at least as great if not more important, of providing a thorough union of foundation and surface, since the two courses are of the same class of materials. This close bonding retards the tendency of the wearing surface to slip or shift under traffic, either on the base or through the integral parts of the surface rolling on themselves. It also permits the use of a somewhat thinner pavement, both as to surface and foundation, than is equally safe when the foundation and surface are of as widely different and non-unified materials as bituminous surface and either crushed stone or portland cement concrete.

Taking the prices to which portland cement has advanced during the past two years, there are many sections where bituminous concrete base costs less that portland cement concrete and there are few places at this time where the cost advantage is in favor of the latter. During the past five years bitulithic pavements and warrenite roads have been laid on bituminous concrete foundations to the extent of over 1,500,000 square yards, most of it to a total depth of five inches (three and one-half of which is bituminous concrete base and one and one-half of wearing surface), and no pavement of this type has been known to crack in the slightest degree.

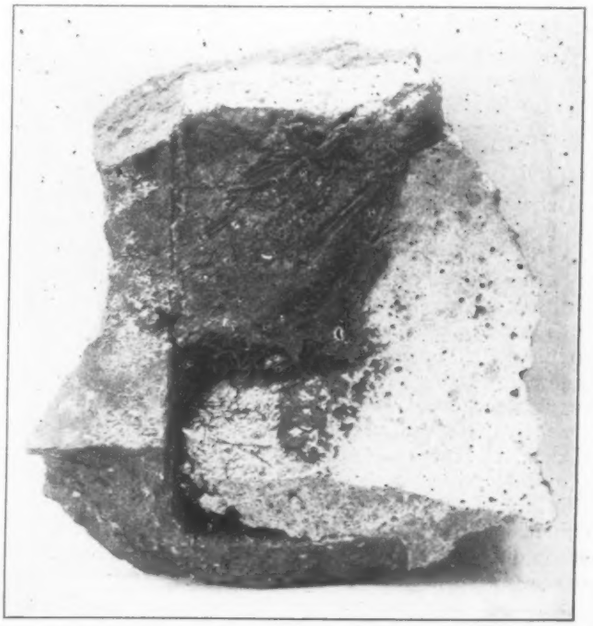
"During the past year the laboratory of the company with which I am associated has done a great deal of work investigating the use of silicate of soda as the cementing material for concrete foundations and finds that, in connection with a substantial water-proof bituminous wearing surface, which is also necessary to secure highest efficiency with portland cement concrete, it is quite practicable to make high-grade concrete foundation in this way. The question is one of relative prices of portland cement and silicate of soda and consequent first cost of construction. We have also successfully laid approximately 10,000 square yards of wearing surface over concrete made of silicate of soda and crushed stone, which concrete had failed to successfully withstand vehicular traffic as a road surface in Cos Cob, Conn., and Sudbury, Ont. The silicate of soda concrete has greater resiliency and less rigidity than portland cement concrete and apparently materially lessens, if it does not entirely overcome, the cracking of Portland cement concrete foundation."



VERTICAL SAWED SECTION THROUGH BITUMINOUS BASE AND WEARING SURFACE, SHOWING BOND. Bitulithic using gravel in mineral aggregate.

WATERTIGHT SEWERS DESIRABLE.

The illustration below was, by an oversight, omitted from the article with the above title in last week's issue, page 809. It shows, at the upper right-hand corner, a root entering a hole in the cement jointing material, from which grew a mass of fibrous roots which filled the pipe.



ROOT GROWING THROUGH CEMENT JOINT IN VITRIFIED PIPE SEWER.

PHYSICAL TESTS FOR GRANITE BLOCKS*

No Satisfactory Tests for Determining Relative Values for Paving Yet Established—Crushing, Impact, and French Coefficient of Wear.

By CLARENCE D. POLLOCK.†

All tests which have been devised for granite intended for use in granite block pavements are more or less unsatisfactory except that of the service test. Until a very few years ago, the test of actual service was the only one used for the purpose of determining the desirability of the different granites for paving. Then a number of cities began applying either the compression test or the toughness test, and some used both.

The American Society of Municipal Improvements at its convention in Wilmington, Del., in October, 1913, inserted a clause in its standard specifications for granite blocks which read as follows: "The granite shall preferably be such as will give above 20,000 pounds per square inch crushing strength, combined with a uniform structure and toughness. The toughness shall be not less than 11 as determined by the method employed by the United States Department of Agriculture, Office of Public Roads."

At the convention in Boston in October, 1914, the above was changed to a minimum crushing strength of 20,000 pounds per square inch, and the toughness was reduced from 11 to 9. Then at the Dayton, Ohio, convention in October, 1915, the crushing strength test for granite was omitted, because, in the words of the committee report, "It has been proven by many tests and by service that the crushing strength of a granite has very little bearing on its value as a pavement."

The test for "French Co-efficient of Wear" was substituted for the crushing strength test as being nearer to the service conditions. The test requirements then read: "For heavy traffic the granite shall have a toughness of not less than nine (9) and a 'French Co-efficient of Wear' of not less than eleven (11). For medium traffic the granite may have a toughness of not less than seven (7) and a 'French Co-efficient of Wear' of not less than eight (8) if a cement grout filler is used. The above tests shall be made by the methods described in Bulletin No. 44, U. S. Department of Agriculture, Office of Public Roads. The average of three (3) tests shall be used for determining toughness and the average of six (6) tests for determining the 'French Co-efficient of Wear.'"

At the Newark, N. J., convention of the American Society of Municipal Improvements, October, 1916, these tests as adopted at Dayton the previous year were again adopted without change.

While these tests are far from perfect, yet they are the best now in use after the service test. Great care should be used in carrying out the details of these tests exactly as is done in the Office of Public Roads in the U. S. Department of Agriculture at Washington, D. C. For example, in getting the "French Co-efficient of Wear," if irregular pieces of granite, such as are obtained from a crusher, are taken, very different results will be obtained than if the pieces are gotten by breaking the stock to approximate cubes as is done at Washington. Because of this lack of attention to details a great deal of trouble and expense is often caused, and it tends to discredit the test when one laboratory gives a sample a high rating and another gives the same granite a low one.

Because of this uncertainty in tests, many engineers do not specify any, but simply use blocks from quarries which have furnished good granite for paving purposes previously as proven by the actual test of traffic.

At the present time various engineers are working along different lines in an endeavor to devise a test or tests which will more nearly approximate the actual traffic conditions, but in an accelerated form.

The idea of using the crushing strength test evidently crept in from its use in selecting building stone. It has very little, if any, relation to the conditions to which the granite will be subjected after it has been incorporated in the pavement, and hence it is not a satisfactory index as to the desirability of various granites for paving blocks. There are many granites with a comparatively low crushing strength which have made most excellent pavements, when properly laid, and there are granites with very high crushing strength which have not proved suitable for paving purposes. A few engineers still hold to this test, but it has been pretty generally discarded.

The impact test for toughness seems to be nearer the actual condition in the street, but it is nevertheless far from being an ideal test. It is necessary that many more samples be subjected to this test and a careful study be made of the results before final judgment can be safely passed upon the merits of this test.

While the test for the "French Co-efficient of Wear" was originally intended to determine the availability of a granite or other stone for use in macadam pavements, yet many of the features which are desirable in a stone for macadam are also desired in granite for paving blocks. Altogether too few tests have been made as yet to prove conclusively just how valuable this test may be in selecting granites for paving blocks. A study of the small number of tests available in connection with the impact tests on the same granites rather indicates that these two tests taken together are a development in the right direction.

There is a good field for experimental work in this matter of tests of granite for paving blocks. The test should be one which causes an effect on the block or test piece as closely resembling the effect of actual traffic on the pavement as possible, but sufficiently intensive, so that ready measurement may be made of the effect after a short period. Until such a test is put in practical form those engineers who do not require tests, but use granites from quarries which have proved satisfactory in the past, will continue to get as good or better pavements than those who specify numerous tests for the stone.

*Paper read before the American Association for the Advancement of Science.

†Consulting engineer, New York City.

FINANCING CONTRACT WORK IN GRINNELL.

The city of Grinnell, Iowa, last December sold about $130,000 worth of special assessment street improvement bonds bearing 5 per cent interest, the bonds being payable at any time within seven years. This is said to be the first large sale by an Iowa municipality of special assessment bonds on a 5 per cent basis. This was one of the first acts of the new city manager government, which took office in September, similar bonds formerly having borne 6 per cent interest.

A few weeks previous the city sold $75,000 of special fund, ten-year, 5 per cent bonds at 1 per cent premium, equivalent to a 4.82 per cent rate. The city also recently sold 4½ per cent funding bonds and waterworks extension bonds, which are general obligations of the city, at a 1 per cent premium.

In letting the contracts for improvements, Iowa cities have the right to pay the contractor in cash, or in bonds, or in improvement certificates. By selling the bonds directly and paying the contractor in cash, Grinnell has effected an interest saving of nearly $10,000 on approximately $200,000 of obligations for improvements.

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1917, MUNICIPAL IMPROVEMENTS AND ECONOMY.

The year 1917 promises to be a trying one for most city officials who are responsible for the maintenance and construction of municipal utilities. Iron, steel, lead, copper and other metals have doubled in price during the past few months, most other materials have advanced 50 per cent or more, and labor demands 50 to 100 per cent increase over what were the ruling wages at the beginning of 1915, and is difficult to obtain at that. In the face of these conditions it is but natural that cities have, during the past year or two, postponed all work which was not essential. But much of such work can not be postponed indefinitely. Engines, pavements and other physical features of public utilities wear out, and repair or replacement of them can not be deferred too long without inconvenience or calamity. New sections must be supplied with water, sewers, street lights and pavements, or suffer in health and safety. Much of this work has been held off as long as possible hoping for a drop in prices that has not come (present indications are that it will not come this year), and the necessity for it is becoming pressing.

It is of some assistance that municipal bonds can be sold to better advantage now than for years previous, and a saving in cost of ten per cent or more may be possible by reason of this. But what is wanted is some means of reducing the cost fifty per cent, more or less. It has been said that an engineer deserving the name can do for one dollar what any one could do for two; in other words, half the cost of securing desired results can be saved by employing the most economical methods known to those most thoroughly informed on the subject.

If this does not offer a sufficient solution of the problem, at least it will help materially in a great many cases. If every proposition be studied thoroughly beforehand to determine the most economical plan, and this plan be carried out with the use of the most effective labor-saving contrivances and methods, a large part of this fifty per cent can be saved, as compared with the haphazard or rush-her-through plan so often followed. In too many cases councils defer action on the year's work until signs of spring give them a jolt, and then instruct their engineers that they must submit plans at the next meeting and receive bids the week following and have the dirt flying inside of a month. They thus fail to secure the saving that might be made by a careful planning, estimating and comparing of several alternative methods of securing the results aimed at; and an additional possible saving by giving time for contractors to carefully study the conditions with a view to employing the most economical methods and reducing their bids accordingly.

This week is not a day too early to begin the actual planning of next April's construction work. And let such planning be made with a view to wise economy. It is not economical to postpone work that is necessary to keep a pavement in good condition, to invite disease by failing to provide the necessary sewers and water supply to new sections of the city, to leave the city at the mercy of fire by neglecting to keep the pumping equipment in perfect repair and adequate in capacity or to provide sufficient reliable hose, or to endanger health by failure to provide for sanitary disposal of refuse. If these things are needed they should be done. But if they are done, they should, under existing circumstances, be done without omitting any economies possible in planning and construction. And this requires that the planning be begun at the earliest possible day and be conducted by the best intelligence available.

AIR DIFFUSERS FOR ACTIVATED SLUDGE.

The activated sludge method of treating sewage has now reached the point where numerous engineers and experimenters are designing and constructing plants of greater or less capacity, but it has not progressed to the point where the construction details are at all standardized. On several points, however, experience has indicated mistakes in certain of the designs and structures and these experiences should be taken advantage of to the end that the mistakes may not be repeated. One of these has to do with the setting of the plates used for diffusing the air. Practically all of the plants, both experimental and service, have used what are known as "Filtros" plates for air diffusers. These plates are generally made 12 by 12 inches by 1½ inches thick for this class of service.

The object of these plates is to cause the air to escape into the sewage in minute bubbles, since the oxidizing effect of the air, to a large extent, is confined to the surface of each air bubble, and the smaller the bubbles the greater the total area of surface contact. Since the surface of a sphere varies as the square of the diameter and its volume as the cube, it follows that if, using the same volume of air, the bubbles can be made by one method with one-tenth the diameter of those supplied by another method of application, the total surface of bubbles is multiplied ten-fold, and the effectiveness of the air by approximately the same amount.

It is evident, therefore, that not only is it necessary to select diffusers which pass the air through in minute bubbles, but the fittings and other construction of the bottom in which the diffusers are placed must be perfectly air-tight. In at least one plant it was found that considerable air was leaking around the edges of the filtros plates and thus, to a considerable extent, defeating their purpose.

Another method which is of even greater importance is that of providing a perfectly rigid installation for

holding the plates. While the plates are quite strong, they, of course, are not flexible. In one plant the plates were installed in wooden frames and when these warped and twisted on account of the absorption of water, as is almost certain to happen with any wood, some of the diffusing plates were broken. This faulty construction was immediately recognized by those in charge and the same kind of plates were again installed, but in rigid containers. Even though the plates are not broken, it is probable that the distortion of the wooden frames will produce an opening of joints somewhere that will permit the escape of air.

In actual service plants probably the construction would be largely of concrete or of iron, and if the frame or containers for holding the plates are made of either of these materials and the plate is not subjected to stress in fastening it in place, there should be little danger of breakage. By providing frames for supporting the plates with a play of possibly one-quarter of an inch, and bedding the plates in cement mortar or warm asphalt or some similar substance, and pouring similar cement around the edges of the plates so as to completely fill the spaces between them, it should be possible to produce a perfectly air-tight joint and one that also will subject the plates to no stress. Possibly other methods will be devised that are better than that just described. The point which we wish to make is that in no plants, even those of a temporary or experimental nature, should the diffusing plates be used without taking proper precautions against undue stressing of the plates or leakage of air through the joints of the structure containing them.

TRACTIVE RESISTANCE ON POOR ROADS.

Everybody knows that more power is required to haul a load on a poor pavement than on a good one. It is only recently, however, that definite figures of the effect of the condition of the pavement on its resistance to traction have been obtained. The information long desired has been furnished by the Massachusetts Institute of Technology, which obtained it by running an electric delivery wagon over pavements and measuring the amount of power required at different speeds. These tests show that it takes 20 per cent more power to run at the rate of 12 miles per hour on a poor asphalt pavement than on a good one. On a poor, soft bituminous macadam pavement, it sometimes takes as much as 125 per cent more power than is required on a good pavement of that type, while such a pavement that is soft but otherwise good requires about 40 per cent more power than a hard one. A poor water-bound macadam pavement requires 60 per cent more power than one in good condition.

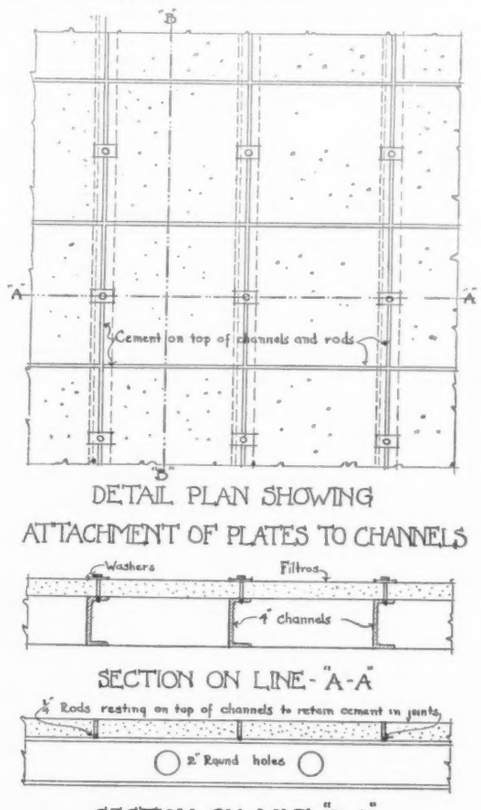
The tests show that the increase in power made necessary by deterioration of pavements mounts up as the speed of the vehicle increases. As most motor vehicles run at the rate of at least 15 miles an hour, the figures given may be considered approximately true of average conditions. They are particularly interesting as enabling the automobile owner to estimate what good pavements are worth to him. It is usually estimated that the average automobile runs 5,000 miles a year and consumes 500 gallons of gasoline. If 1,000 miles are made on bituminous roads and half of such roads are in poor condition, and 4,000 miles are made on macadam roads of which two-thirds are in poor condition, and if it is further assumed that the poor character of the roads increases the power requirements by 50 per cent, then about 120 gallons of gasoline were used on account of the poor character of these pavements. At 21 cents a gallon this means an average annual tax of about $25 for gasoline to pay for poor roads.

The case is different with horse-drawn vehicles, for with them the loss is not measured in extra feed for the horses, but in the slow speed maintained by such vehicles on poor pavements. In other words, the loss lies in the reduced amount of work it is possible to perform under practical conditions.

WINTER WORK ON BITUMINOUS PAVEMENTS.

Our attention has recently been called to two wrinkles in connection with laying "hot stuff" in cold weather which, while probably not new to some of our readers, may be so to others. One of these was rather a fall than a winter proposition, in that it was a method for getting rid of the dead leaves which were falling from the trees continuously and stuck to the wet concrete base so that it was difficult to sweep them off, and were also pressed into the bottom course of a two-course bituminous pavement by the feet of the workmen. In each case, an ordinary surface heater was used, employing a flame which gave just sufficient heat to ignite the leaves, but not enough to either injure the concrete or burn the asphalt. This method of getting rid of the leaves was apparently fully as cheap and much more successful that the use of a broom, and in addition heated the surface just before the laying of the bituminous material, which is considered an advantage.

The second instance referred to also involved the use of the surface heater, but in this case it was for getting rid of snow and ice on the concrete base in order to permit laying sheet asphalt pavement. In Fort Wayne, during December, the contractor continued to lay a sheet asphalt pavement on a concrete base which was already down, even though snow lay upon it, by shoveling off what snow could be readily removed in this way and removing the remainder by melting and evaporating, at the same time heating the concrete base.



METHOD OF FASTENING DIFFUSING PLATES IN ACTIVATED SLUDGE TANK.

The WEEK'S NEWS

State Highway Work in Virginia and Arkansas—Health Organization of California—Utility Regulation in New York and New Jersey—Lighting Contracts in Klamath Falls and Council Bluffs—Many Fires Mark Week—Causes of New York Fires Analyzed—Research Work Begins in San Francisco—City Garbage Plants in Rochester and Butte—Regulating Automobile Traffic in Detroit—New York's New Subways Near Completion—Des Moines Mayor Takes Coal for Poor—New Municipal Market for Elizabeth City, N. C.

ROADS AND PAVEMENTS

Jefferson Highway Route Completed.

New Orleans, La.—The official route of the Jefferson Highway, between Winnipeg, Canada, and New Orleans, two thousand miles, has been announced by J. D. Clarkson of Des Moines, general manager of the highway. The highway through Louisiana will run on the east side of the Mississippi river from New Orleans to Baton Rouge, where it will cross the Mississippi and run northward through Port Allen and Melville to Alexandria, thence through Pineville, Bagdad, Colfax to Shreveport. Leaving Louisiana at Shreveport, the route is through Denison, Tex., and Muskogee, Okla., to Joplin, Mo. From Joplin to Kansas City, the east route will be through Carthage, Mo., and the west route through Fort Scott and Pittsburg, Kansas. From Kansas City, the route will run through St. Joseph, Mo., to Des Moines and Mason City, Ia., Minneapolis and St. Paul, north to Winnipeg. Mr. Clarkson announced that fully 50 per cent of the highway already was constructed, or the money was in local treasuries to cover cost of completion.

Convicts on Virginia Road Work.

Richmond, Va.—Seven hundred miles of improved roads were built in the state last year under the state highway commission, according to the report of G. P. Coleman, the commissioner, just submitted to the governor. The cost of this good road work was $1,571,957.59. In addition to the construction work fifteen miles of roads were given asphalt or oil treatment. In this work 2,000 men were employed. Cost of working the convicts averaged 57½ cents a day. Mr. Coleman urges that every man in the county jails be put to work on the roads of the state. Mr. Coleman suggests that the convicts be paid five cents a day for the time they are on the roads, so that when released they will not be penniless.

State Road Progress in Arkansas.

Little Rock, Ark.—Satisfactory progress in good road building in Arkansas is shown by the biennial report of W. B. Owen, state highway commissioner. It has followed a campaign of education and agitation extending over a long period of years. Following the creation of a state department there has been a remarkable impetus to the movement. Improvements and extensions of the present statutory provisions are contemplated in the session of the General Assembly to convene in January. During the two years now closing, the department has made preliminary surveys, plans and estimates of cost for 2,232.73 miles of improved road, of which 2,109.02 miles are sure of construction. It is estimated that the cost of these roads will be $8,651,161.61. The total cost of this preliminary work was $15,761.62, an average cost per mile of $7.50. There is now in the state highway commission fund, and payable Jan. 1, 1917, a total of $88,900.47. This, with the state's share of $5 from each automobile license issued in the state, will, according to the plans of the commissioner, make a nucleus for the annual appropriation to be made by the state to enable Arkansas to participate in the federal good road fund. There is now under actual construction a total of 429.14 miles in 25 counties being built at an actual cost of $1,941,895.47. Of the total amount of improved road being built, the greater part of it, costing a total of $1,113,172.22, is being constructed under the Alexander Road Law, which was passed by the legislature of 1915, and has since been sustained in various phases by the Supreme Court. It has proved one of the most progressive pieces of road legislation ever enacted in Arkansas, and will probably be supplemented by additional laws. In his report, Commissioner Owen says: "There has been collected and expended from the 3-mill tax during the last fourteen years about $13,500,000. Out of this immense sum but little of what might be termed permanent roads has been built. Some counties have assisted road improvement districts by contributions from this fund, but most of it was collected in such small amounts and expended in large territories that it was impossible to do anything with it in the way of permanent improvement. However, the people are so anxious for road improvement that they still continue to vote the 3-mill tax, and seem to be glad to get even the improvements they do under the antiquated system. Constitution amendment No. 14, submitted at the last general election, needed only a few thousand more votes even though the caption was misleading, to secure its adoption, which shows that if the question of a bond issue, properly limited and safeguarded, were submitted, it would be approved by the people of the state. If we are to meet future requirements for permanent roads, it will be necessary to secure larger sums of money than can be obtained each year from the 3-mill tax. Therefore we recommend a constitutional amendment similar to that submitted for adoption at the last election, be submitted at the next one."

SEWERAGE AND SANITATION

State Health Board Awarded Fine.

New Albany, Ind.—A finding for $1,000 against the New Albany Waterworks has been returned in the Clark Circuit Court, Jeffersonville. The case originated in an effort to compel the New Albany waterworks to install a filtration system so that the water from the Ohio River could be purified for drinking purposes. An order was made that the system should be installed and there was a delay. The State Board of Health then issued an order December 30, 1913, that the filtering plant must be installed by December 31, 1914, or the company would be subjected to a penalty of $500 per day until the work was done. Suit for $13,500 penalty was filed January 28, 1915. This finally was compromised on a basis of $1,000.

To Divide State Into Health Districts.

Sacramento, Cal.—There will be two districts north and four districts south of Sacramento, if the legislature at its coming session approves plans of the State Board of Health for dividing California into health districts. The draft of a bill which has this object in view has been tentatively agreed upon by the board and probably will be submitted to the lawmakers when they convene, with few, if any, changes. The creation of health districts and their administration by specially appointed health officers is regarded by the state health authorities as the most important thing in their legislative program. For the purpose of dividing the population as equally as possible in accordance with the need of counties for better health and sanitation control, it is proposed to create three districts along the coast and three in the interior. In addition to the appointment of health officers, the bill provides for the appointment of ten sanitary inspectors with police powers to making arrests for violations of the state health laws. The

salary proposed for health officers to be paid by the state is $3,000, and for sanitary inspectors $1,800 each, together with traveling expenses. To qualify for appointment it is provided in the draft that each district health officer shall be the holder of a degree in medicine, sanitary engineering, or public health and shall have had at least a year's experience in public health work.

Investigate Fire of Gas in Sewer.

St. Paul, Minn.—The results of investigations indicate that the recent explosion and fire which trapped and severely burned six workmen in a sewer sixty-five feet under ground, were caused by the presence of gasoline fumes. W. Symonds, superintendent of sewers, blamed the explosion on gasoline and lubricating oils drained into the sewers from garages in the downtown district. The six workmen were repairing the sides anl roof of the sewer tunnel when the explosion occurred. The men ran through the "liquid flames" and two men fell into the liquid, but were rescued by their foreman. Three were caught for nearly an hour until rescued through a manhole.

WATER SUPPLY

Plan Waterworks Improvements.

Lawrence, Kans.—Plans for the improvement of the Lawrence water plant in such a way that it will be placed beyond flood danger and will be increased in capacity sufficiently to serve the entire city adequately are nearing completion at the office of Black & Veatch, the consulting engineers, at Kansas City, Mo. When they are completed, the plans will be sent to the state public utilities commission for approval. The approval of the state board of health will also have to be secured. The plans as drawn involve the moving of the pumping station to a new location, where it will be about thirty-five feet above the level of the present plant. The estimates of the engineers show it will be cheaper to move the plant than it will be to assure complete flood protection in the old location.

Commission Decides Against Water Company.

Scarboro, Me.—The public utilities commission has rendered a decision in the complaint of a number of consumers against the Scarboro Water Company. The complainants alleged that the respondents' rates, tolls and charges were excessive and not commensurate with the service rendered; that the service furnished is insufficient in that the subscribers have frequently been unable to obtain water owing to the inadequacy of the system of the company, and that the quality of the water furnished is unfit for domestic use. The decision says that "the present service is not reasonably adequate as to quantity. . . . The respondent says that its springs and reservoir contain plenty of water, that plenty was pumped and that if there was a shortage at the consumers' faucets it was due to waste on their part through open services, leaking fixtures and otherwise. Undoubtedly there was more or less waste, but the evidence as to its amount is very hazy and the burden is upon the respondent to justify its inadequacy of supply once the inadequacy is established. Moreover, we cannot agree that proof of waste by some consumers would necessarily justify failure to deliver water to other consumers. Before a public utility can avail itself of such a defense it must show that it has been diligent in its effort to prevent it. It can establish reasonable regulation. It can impose reasonable and appropriate penalties for their violation. It can do everything that is reasonably necessary to stay the waste of its water. We think, however, that while there has probably been much waste of water—and this is to be expected under 'flat' rates—the trouble may be remedied by pumping longer hours, perhaps by beginning earlier in the morning." The allegation as to the respondents' rate, tolls and charges was found to be not sustained by the evidence and was dismissed. The supply of water furnished by the respondent was declared inadequate and insufficient in quantity and not reasonably constant. The water furnished for domestic purposes was found not unfit for use for such purposes, but it was declared that the source of supply is not adequately protected against contamination. The company is required to line that part of its reservoir now not so lined, exclusive of its dam, with cobblestones imbedded in blue clay or with some other substance equally impervious to water to a height of not less than eight feet and to construct a fence around the reservoir.

Accounting Systems for Municipal Utilities.

Tacoma, Wash.—The state bureau of inspection has issued new classifications in connection with its established systems of uniform accounting for municipally-owned light and power plants and waterworks. The formulation and revision of this work was accomplished under direction of State Auditor C. W. Clausen by James F. Leghorn, member of the bureau, and Millard Stryker, state examiner. The scope of the work is broad and embraces the most modern and direct methods which have proved to be practical in actual service test by the bureau. This is in line with improvements which have been continually made from year to year by the bureau in the accounting for all public institutions and providing for the constant changes and development involved in public administration and ownership. The classifications are designed to enable each clerk or other employee to clearly understand and comply with his individual share in the requirements. Full provision is made for the accounting of plant property, construction and other assets, liabilities, revenues, expenses, including depreciation, interest and other deductions, losses, gains, bond and other reserve appropriations, redemption of debt, etc. All accounting requirements which have arisen to date have been provided for. The classified reports include complete exhibit of financial condition and operation and make available the data required for equitable adjustment of rates and providing safely for all operations and redemption of debt. The Seattle light and power department, which has the largest municipal plant of its kind in the state, has been completely systematized by the bureau of inspection, according to the new classification, with excellent results. The accounting of the Tacoma light and water departments will be brought to the same basis. The accounting department of the Tacoma light and water plants has co-operated with the bureau in installing the improved methods. In 1912 the obsolete method of fund and warrant accounting was discarded. The departments have greatly benefited by the resuts obtained, it is said, and with the completion of the plant valuations will have up-to-date records of all properties. The departments of light and water, in connection with the classifications, have established the inter-relating sub-accounts suitable to local requirements.

STREET LIGHTING AND POWER

Company Will Not Fight Rate-Reducing Order.

New York, N. Y.—The Edison Electric Illuminating Company of Brooklyn will not fight the Public Service Commission in the courts on the order issued by the commission directing the company to reduce its rates on January 1 from the maximum of 11 cents to 8 cents per kilowatt hour. A compromise, involving a modification of the order, was effected at a rehearing of the case. The rehearing was preceded by a series of conferences between the officials of the company and the commission. These conferences were held for the purpose of reaching an agreement, if possible, without litigation. The commission now issues a modified order, which changes the rate for the "excess over four hours' average daily use of the maximum demand." In the commission's first order it was provided that the maximum demand should be calculated as not in excess of 25 per cent of the consumer's corrected load, in the case of residence customers, and not in excess of 50 per cent of the load for other customers. This is raised from 25 to 50 per cent and from 50 per cent to 75 per cent, respectively, in the new order, restoring the old figures. The modified order, acording to Commissioner Whitney, will save electricity users in

Brooklyn $670,000 a year. It went into effect on January 1. The original order, it was estimated, meant a saving to the consumers of $1,000,000 per annum. Walter F. Wells, vice president of the company, in requesting that the existing order be modified, told the commission that during the past year the cost of producing electricity had been very much increased, owing chiefly to the price of labor and coal. He said the company was paying an average of $4.68 per ton for coal now, as against an average of $2.92 per ton last year, and that the company had paid as high as $8.16 a ton. Many classes of employees are now receiving as much pay for eight hours' work as they formerly did for nine or ten. The company also faces large capital expenditures in the extension of its mains. The rate case of the Brooklyn Edison Company had been pending before the Public Service Commission for four years. At the public hearings held in the matter the company claimed a valuation of $38,800,000 on its property, exclusive of franchise and going value. The commission allowed $22,000,000. At the new rates fixed by the commission the latter estimated that the company would have a return of 7 per cent.

New Jersey Gas Case Before Highest Court.

Passaic, N. J.—The ninety cent gas fight, instituted some time ago by Passaic and Paterson against the Public Service Gas Company, will be finally heard before the Supreme Court of the United States, in Washington, shortly after the first of the year. Briefs have already been submitted by the Public Service officials who have appealed the decision of the Board of Public Utilities, of December 26, 1912. The defense is being prepared jointly by the Utilities Commission, the city of Passaic and the city of Paterson. The hearing will be held before the full court in Washington. George L. Record, Albert O. Miller and Francis Scott will represent the cities of Passaic and Paterson. The suit was originally started by Passaic when a certiorari was issued out of the Supreme Court to review an order of the Board of Public Utility Commissioners, reducing the rate for gas from $1.10 per thousand cubic feet (subject to a discount of ten cents for prompt payment) to ninety cents throughout what is called the Passaic division of the territory in which the Public Service manufactures and distributes gas. The Public Service objects to the order claiming that it prohibits it from earning a reasonable income on a fair value of its property. The Supreme Court of New Jersey affirmed the order of the commission and on application to the Court of Errors and Appeals, the judgment of the Supreme Court was at first reversed by a vote of six to four. On re-argument the court reversed its judgment and adopted the opinion of the Supreme Court also by a vote of six to four. The gas company owns property in the Passaic division, as was shown by an appraisal made at the time the case was first started, amounting to over $7,500,000. The company claims that the ninety cent gas order prohibits it from earning more than 4.51 per cent on the lowest estimate of the value of all its gas property in the division, or more than 4.34 per cent on its capitalization.

New Light Contract Signed.

Council Bluffs, Ia.—The city council has authorized the mayor to sign the five-year contract with the local light company recently drawn by city solicitor Henry Peterson. The rates for street lighting will be as follows after Jan. 1:

For 60-candle-power lights for residence streets, $15 each the year; for 400-candle-power incandescents to take place of arc lights, $31 a year each; for one-lamp poles, 400-candle incandescent, ornamental poles, both lamps to burn all night, $68; same as preceding, to burn one lamp all night and one lamp until midnight, $58 each yer year. Provision is made for care of the system pending completion of the new installation, whereby the arc lights are to pay at the rate of $62 a year each, the present rate. Incandescents installed temporarily will pay at the new rate.

Provision also is made that the rate for private commercial consumption shall be as follows:

For the first 150 kilowatt hours, 6 cents per kwh.; for the next 1,050 kwh., 5 cents per kwh.; next 2,800 kwh., 4 cents; next 3,000 kwh., 3 cents; and for all additional current used, 2½ cents per kwh.

Power rates fixed by the new contract are to be as follows:

First 100 kilowatt hours, 6 cents per kwh.; next 100 kwh., 5½ cents per kwh.; next 100 kwh., 5 cents per kwh.; next 100 kwh., 4½ cents; next 300 kwh., 4 cents; next 500 kwh., 3 cents; next 2,800 kwh., 2½ cents; next 6,000 kwh., 2 cents; all current in excess of the above, 1½ cents per kwh., with a minimum charge of 50 cents per horse-power up to 20 horse-power, and 25 cents per horse-power for motors above 20 horse. Both power and light rates provide that the company shall bill the consumer ½ cent per kilowatt hour or per horse-power, additional, the same to be deducted if the bill is paid before the fifteenth of the month, but collected if not paid. In connection with the above rates the contract fixes the rate for gas at $1.10 per 1,000 cubic feet if the bill be paid before the fifteenth of the month, and $1.25 per 1,000 cubic feet if paid after the fifteenth.

Provision is made for extensions of both electrical lines and gas mains for private consumers, specifying that gas mains shall be extended whenever there shall be six consumers ready for service for 500 feet of extension. Electrical lines shall be extended whenever there shall be 400 feet of extension where lines are carried on poles already in operation, and where there is one consumer to 240 feet where poles must be set. Special provision is made that a wholesale rate shall be made under specific conditions to large users, under supervision of the city, and this wholesale rate shall not be classed as discriminatory against smaller users. A special rate also is fixed for an emergency installation at the rate of $1 per horsepower of such emergency installation. Another provision of the new contract is that in case the city should take over the plant, the profits of the company shall not be calculated in valuing the equipment.

Municipal Plant in Active Competition.

Cleveland, O.—In a new campaign for power business, the city lighting department is preparing to invade the territory of the competing private company. "We will send circulars to 250 power consumers on the books of the Cleveland Electric Illuminating Co. announcing that the city board of control has adopted a resolution granting a discount up to 20 per cent to concerns that arrange to use power at off peak periods. We will also inform these concerns that the city is preparing to expend $2,000,000 on its E. 53d street plant," said Lighting Commissioner W. E. Davis.

Meters for Municipal Heating Service.

Buhl, Minn.—The village will install meters to measure the amount of heat furnished customers of the village heating plant and to stop the waste. This was decided after the council heard the report of J. Myers, a Minneapolis engineer, engaged to make a survey. The investigation was made after attorney W. D. Bailey, of Duluth, representing mining companies paying taxes here, called attento the deficit in the heating plant's business amounting to about $10,000 and demanded that it be corrected. Engineer Myers found as causes for the deficit: (1) The existence of a flat rate which causes customers to be indifferent to the quantity they consume. Myers recommended the installation immediately of meters at a cost of approximately $5,000, which would be repaid within the first year afterward and cause a decrease in total expenses of 25 per cent. (2) The uncovering of service mains. (3) An inefficient system of coal haulage, which costs annually $25,000, while with proper equipment the same work could be done for $300. (4) Lack of efficiency in the power plant, where no records at all have been kept. Mr. Myers said that the lack of records prevented him making a complete report. "The greatest difficulty that has appeared," said the expert, "seems to be the tremendous waste occurring from selling steam on a strictly flat basis. Where all the waste occurs is a question, but some of it is due to the inefficient use of steam by consumers. There should be higher efficiency in the power plant, which has no records at all on coal consumption, evaporation and water fed to the boilers. The firemen have no method of ascertaining the efficiency of production. They couldn't increase that efficiency if they wanted to." The lighting department, Mr. Myers said, was "in a healthy condition," but he found another "terrific wastage" when it came to water. The daily output is approximately 225,000 gallons, which is 75,000 too much. The pumpage should be cut down to 40 per cent, he said.

FIRE AND POLICE

Fireman Killed by Falling Girders.

Erie, Pa.—One fireman was killed and another seriously injured at a fire which destroyed a machine shop with a total loss of $150,000. Charles A. Liebau, captain of Hook and Ladder Company No. 1, died after twelve hours in the hospital, and pipeman Charles G. Fetscher will recover from his injuries. Liebau and Fetscher were hurt when the blaze was practically out and the companies were preparing to leave. The two were exploring the ruins when a big steel crane with girders crashed through the second floor, dragging them down. Liebau's skull was crushed and he was pinned down by heavy timbers. He never recovered consciousness. Fetscher was revived with a pulmotor. Captain Liebau had been on the force seventeen years, and his death at a fire was the first in the department in 36 years.

Three Firemen Hurt by Falling Wall.

New Castle, Pa.—Three firemen were badly injured and fully a quarter million dollars property loss was suffered in a disastrous early morning blaze that completely gutted a big dry goods store. Heavy damage by smoke and water were inflicted upon adjoining stores. The firemen injured were George Rae, John Gross, Jr., and H. C. Stockman. They were caught under a falling wall, while upon the roof of an adjoining building fighting the flames. For a time it was feared an entire block of business structures was doomed, but they were saved after desperate work. Firemen played water on the ruins for twelve hours before beginning the removal of walls that endangered pedestrians. Washington street, the principal business thoroughfare, was closed for traffic until afternoon. The origin of the fire is unknown.

Ladder Collapses Under Hose Lines.

Birmingham, Ala.—For three hours men from every fire station in the downtown district fought strenuously to control a big store fire which did a total damage of $150,000. Twenty streams of water were played on the blaze which had attacked the whole building by the time the firemen arrived. The aerial ladder of station 6 gave way under the weight of three "live" lines of hose and fell to the street. Fireman J. R. Stark was struck by the ladder and thrown several feet and injured.

Cause of New York Fires.

New York, N. Y.—After collating and analyzing the details of a very large percentage of all fires in New York, the Actuarial Bureau of the National Board of Fire Underwriters has ascertained the causes of these fires, for the year 1915, with their relative losses to have been as follows:

STRICTLY PREVENTABLE CAUSES.

Defective chimneys and flues	$826,997	or 4.1%
Fireworks, firecrackers, etc	32,506	or 0.2%
Gas, natural and artificial		
Hot ashes and coals	42,323	or 0.2%
Ignition of hot grease, oil, tar, wax, asphalt, etc	74,170	or 0.4%
Hot or molten metal	5,634	or 0.0%
Matches	867,728	or 4.3%
Open fires	95,005	or 0.5%
Open lights	230,742	or 1.1%
Petroleum and its products	234,633	or 1.2%
Rubbish and litter	44,609	or 0.2%
Smoking (cigars, cigarettes, pipes, etc.)	801,582	or 4.0%
Steam and hot water pipes	95,005	or 0.5%
Stoves, furnaces, boilers and their pipes	869,475	or 4.3%
Total	$4,358.618	or 21.7%

In each of these cases, in the preceding table, it is claimed that preliminary inspection would have shown the element of danger, which then might have been easily remedied.

PARTLY PREVENTABLE CAUSES.

Electricity	935,413	or 4.7%
Explosions	312,871	or 1.6%
Exposure	2,861,090	or 14.3%
Incendiarism	593,107	or 3.0%
Lightning	389,796	or 1.9%
Miscellaneous, cause known but not classified	264,246	or 1.3%
Sparks—from fires	221,023	or 1.1%
Sparks—from machinery	173,271	or 0.9%
Spontaneous combusion	619,690	or 3.1%
Total	$6,370,507	or 31.9%

It is estimated that at least half of the loss occasioned by electricity, sparks from fires, and spontaneous combustion was preventable, and that all the other causes had some degree of preventability.

UNKNOWN CAUSES.

Probably largely preventable.....$9,346,286 or 46.5%

New York makes an interesting comparison with the neighboring States of Pensylvania and New Jersey in the various causes cited.

STRICTLY PREVENTABLE CAUSES

	New York.	New Jersey.	Pennsylvania.
Chimneys and flues	4.1%	3.2%	4.0%
Fireworks	0.2%	0.0%	0.2%
Gas	0.7%	0.2%	1.2%
Ashes and coals	0.2%	0.4%	0.3%
Grease, oil, etc	0.4%	0.2%	0.2%
Metal	0.0%	0.0%	0.1%
Matches	4.3%	2.4%	1.9%
Open fires	0.5%	0.2%	1.0%
Open lights	1.1%	0.7%	0.7%
Petroleum, etc.	1.2%	0.8%	3.6%
Rubbish, etc.	0.2%	0.2%	0.3%
Smoking	4.0%	2.4%	1.9%
Steam pipes, etc	0.5%	0.1%	0.4%
Stoves, etc.	4.3%	3.2%	4.0%
	21.7%	14.0%	17.4%

PARTLY PREVENTABLE CAUSES.

Electricity	4.7%	3.9%	6.0%
Exposure	14.3%	7.0%	13.5%
Explosions	1.6%	0.5%	1.6%
Incendiarism	3.0%	3.2%	3.4%
Lightning	1.9%	2.5%	2.9%
Miscellaneous	1.3%	1.9%	1.8%
Sparks—from fires	1.1%	1.4%	1.6%
Sparks—from machinery	0.9%	1.1%	0.2%
Spontaneous combusion	3.1%	2.4%	3.3%
	31.9%	23.9%	35.3%
Unknown	46.5%	62.2%	47.0%

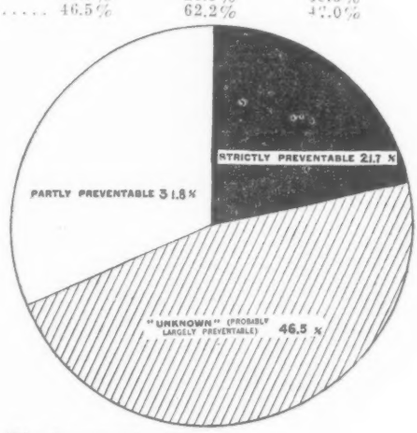


CHART CLASSIFYING CAUSES OF FIRES IN NEW YORK IN 1915.

Big Ironworks Fire.

Los Angeles, Cal.—Starting early in the morning from some unknown origin, a rapidly spreading fire totally destroyed the big plant of the Llewellyn Iron Works with a loss of nearly $500,000. While company officials and detectives blame the blaze on crossed wires, the local police persist in their theory that it was due to the bomb and gasoline bladders of an incendiary. The plant employs 600 men but only 50 were working on the night shift and no one was injured. Two distinct explosions were heard and instantly the building was enveloped in flames. Many of the men escaped with difficulty through the tangles of live electric wires. By the time the firemen reached the scene the plant was doomed and their efforts were concentrated on saving adjoining factories.

Frozen Water Hampers Men in Institutional Fire.

Wichita, Kan.—At least five persons are reported to have been burnt to death and several injured as the result of a fire that destroyed the main building of the Kansas Masonic home in an early morning fire. In addition scores of old men and women and children were exposed to the effects of the flames and blizzard weather. Many were rescued with difficulty and several, made unconscious by the smoke and fire, or overcome by the intense cold, as they fled from the burning structure in their night clothes, were taken to hospitals and private homes. There were 92 inmates in the home, a large three-story brick building, built in the form of a key. A boy sleeping in the basement of the

building discovered the flames and in his efforts to sound the alarm shut off the lights. When the firemen arrived the flames had gained great headway and their efforts toward suppressing the flames were hampered by frozen water plugs, the thermometer being about eight degrees above zero. Most of the children were taken out by the firemen, but two crippled women and eight of the little ones are believed to have perished. The fire is thought to have been caused by a defective furnace. The loss is given as about $250,000.

Small Town Destroyed by Fire.

Vinton, Cal.—Fire of unknown origin, starting in a vacant building at night, practically wiped out the town of Vinton in Sierra valley. A blizzard was raging at the time and the fire, fanned by a high wind, jumped from block to block. The Nevada-California-Oregon railroad station and postoffice were destroyed. The town has no fire fighting apparatus and was practically doomed from the start.

Hide Plant and Freight Yard Fire.

East St. Louis, Ill.—A difficult fire destroyed all but 100 feet of a big frame building of a hide and leather plant which was 1,005 feet long and 30 feet wide. The portion of the building that was saved contained most of the company's stock. In the burnt portion six or seven carloads of hides were destroyed, involving a loss of between $15,000 and $18,000. The loss on the building, owned by the Wabash Railroad and formerly used as in-bound freight house, is about $10,000. The odors from the burning hides made the day unpleasant in East St. Louis and other east side cities. Between 20 and 25 box cars on side tracks near by were burned, each representing a loss of about $600 above the truck salvage. Most of them were loaded with cotton and firemen had to put each bale out separately. Many other cars were near the fire and some were blazing as a dozen switch engines worked busily drawing them away. The total loss was about $50,000.

GOVERNMENT AND FINANCE

Appoint New City Manager.

Sumter, S. C.—The city council has appointed E. S. Shuler as city manager. The former manager, L. E. White, left the service of the city on the first of the year.

San Francisco Research Bureau Begins Work.

San Francisco, Cal.—The San Francisco Bureau of Governmental Research has launched its campaign for many reforms in the municipal affairs of this city. Winfred B. Holton, Jr., the newly appointed director of the bureau, has arrived and taken up his duties. The municipal accounting system and the budget for the fiscal year 1917-18 will be among the first problems to receive the attention of the researchers. The result of the survey made recently by experts from the New York Bureau of Municipal Research, of which Holton was assistant director, have convinced the organizers of the new bureau here that there is much for them to do in San Francisco. Director Holton has outlined his plans only in a tentative way, but it is understood that the staff directly under him will include at least one engineer, accountants, clerical employees and field workers. "This bureau is not a self-seeking organization," according to an announcement by Bruce Cornwall, chairman of the board of trustees. "It has been guaranteed $100,000 to begin the work and is organized for five years of activity. Its purpose is, by thorough and competent investigation, to assist the public officials of this city in plans that will make for higher efficiency and greater economy in the conduct of the city's business. The bureau proposes to give its first attention to the installation of a scientific system of public accounting in the municipal government, and to making a budget that will materially reduce the taxes in this city. This bureau seeks no credit for anything that may be accomplished. That will rest upon those officials who shall by their own action accomplish the results that the bureau hopes to achieve." That 95 per cent. of the recommendations of the Bureau of Municipal Research in the fire department will be adopted, is the prediction of Mr. Cornwall. "The total cost of the recent municipal survey was $8,159, and this amount has already been saved several times over," said Cornwall. "The fire commissioners have transferred $15,000 from the salary fund to the motorization fund, and it will be used to buy motor-driven apparatus; the water tower equipment, which is rarely used, has been placed on the auxiliary list, saving $23,000 a year, and other savings have been effected. With no other authority of backing than public opinion, we are making great strides in this work. Our motto is: 'A dollar's worth of service for a dollar's worth of taxes.' It costs every man, woman and child $53 a year to run this city, while the average cost of large cities is only $30. That is why we need efficiency."

Budget of Canadian City.

Victoria, B. C.—The municipal budget of the city of Victoria for 1917 calls for an expenditure of $1,799,695, which shows no increase over last year. According to the estimates 42 cents out of every dollar collected through direct property tax will go to pay the debt and other fixed charges. The total debt charges are made up as follows: General city debt, $456,780; waterworks, $209,823; schools, $95,639; total, $762,242. The estimated expenditures are: City debt, $456,780; municipal council, $7,000; legal department, $7,498; civic salaries, $32,264; city institutions, $317,224; buildings, $1,850; miscellaneous, $78,350; education, $325,640; board of health, $35,000; waterworks department, $246,769; waterworks, $291,320; total, $1,799,695. The requirements for city departments include: Fire, $129,478, of which $33,836 is for 808 hydrant rentals; police, $84,433; light, $41,730; parks, $18,206; library, $14,360; market, $3,192; Home for Aged and Infirm, $13,162; labor bureau, $1,510; cemetery, $5,073; stores, $2,799; pound, $2,460.

STREET CLEANING AND REFUSE DISPOSAL

City Takes Over Garbage Plant.

Rochester, N. Y.—The council has authorized the issue of $135,000 in city notes to pay for the plant of the Genesee Reduction company, which has been appraised at $127,414, and to pay for the expenses of the transfer and minor alterations to the plant. The garbage collection service and the reduction plant were taken over by the department of public works for operation by the city on January 1.

New Incinerator in Operation.

Butte, Mont.—Butte's new $40,000 incinerator has been started in operation and will henceforth dispose of all the garbage collected by the city, which cannot be salvaged and disposed of profitably. In addition to destroying the rubbish, carcasses and other city waste, the big furnace will supply steam heat for the city's blacksmith and machine shop. Smoke which issued from the top of the 125-foot concrete stack when operation began was of only a white, misty form and not of the nature to be objectionable. The city officials were well pleased at the success of the first day's run.

City Refuse Collection in Schenectady.

Schenectady, N. Y.—The $6,500 loan asked for by commissioner of public works Hunt to carry on the work of garbage and ash collection to January 1, and which has been authorized by the common council, is $500 less than the amount the commissioner estimated would be needed when plans were made to take over the collections from contractor Michael F. Dollard. The city to date has derived $1,950 in revenues from the garbage disposal plant, sale of rags and paper and other sources since taking over the work, which is fully up to what had been estimated, while the cost of operating has been held below commissioner Hunt's estimate. These factors made it possible for him to cut his original expense estimate of $7,000 to $6,500. During the four months which ended December 1 the city collected 17,412,000 pounds of ashes and other refuse. The heaviest work has been done in the business district where, since November 1, an extra team has had to be used to meet an increase of 50 per cent in the volume of collections. Seven-day collections are being made

from about 80 business places and twice-a-day collections are being made from other downtown business places, in addition to regular truck collections. The volume of garbage at the receiving station has dropped from the daily maximum of 32¼ tons to a daily average of 12 tons. This is partly due to seasonal change, but most of it, according to commissioner Hunt, comes from the amount of collections made by individuals operating under unexpired permits and to quantities of garbage hauled away by farmers. The loss to the city caused by garbage diverted from the reduction plant, estimated by present conditions, the commissioner states, would amount to about $10,950 a year.

TRAFFIC AND TRANSPORTATION

State Auto License Plates Made by Convicts.

Harrisburg, Pa.—The 1916 Pennsylvania automobile license plates will be recognized until January 15, 1917. State highway commissioner Black issued a statement to police authorities in the various cities in the state that owing to the non-delivery of license plates by the Prison Labor Commission, which has the contract for their manufacture, it would be impossible to send out 1917 plates as rapidly as the applications were received. The contract with the Prison Labor Commission called for the delivery of the automobile license plates not later than November 1, of 1916. Owing to unforeseen contingencies, the Prison Labor Commission was unable to deliver according to the terms of the contract and, at the present time, their output at the Huntingdon Reformatory, where the tags are being made, is limited to 2,500 sets of license plates a day. Applications received at the automobile division of the department far exceed this number daily and the entire reserve supply previously delivered has been exhausted. At the close of business on December 27, the total amount received for 1917 motor vehicle licenses was $786,422.00. On Wednesday, December 27, all records were broken in the amount of money received, the net amount being $97,501.

Detroit Auto Ordinances.

Detroit, Mich.—Because of difficulty in enforcement and some misunderstanding on the part of the public as to what auto ordinances the police department are enforcing, police commissioner Couzens has again announced the new laws which control traffic on Detroit streets. Motorists are required to stop at the rear of street cars which have stopped for passengers. Glaring headlights are forbidden on any street, avenue or boulevard. Proper lights are required, rear and front, on automobiles, and rear lights on other vehicles. Running cars with muffler open or with volume of smoke emitted therefrom is forbidden. Vehicles are forbidden to back to curb except when actually loading or unloading and then can remain no longer than necessary. The police are directed to tow away and make complaints against owners of cars parked in safety zones or in position to obstruct traffic, those within 75 feet of a street intersection where street cars stop, or within 15 feet of a fire hydrant.

Progress of New York's New Subways.

New York, N. Y.—Only six general construction contracts out of ninety for the dual system of rapid transit yet remain to be awarded by the Public Service Commission for the First District. Several important portions of the new lines will be placed in operation during the year 1917, adding materially to the present traffic facilities of the city. Several track installation contracts and station finish contracts for a number of stations yet remain to be awarded. These for the most part will be delivered during 1917. At the end of the year the Public Service Commission had completed or had awarded contracts for construction work on the new lines to be owned by the city aggregating $196,278,900.48. In addition, expenditures had already been made or authorized to the amount of nearly $15,000,000 for real estate in connection with rapid transit work. Portions of this real estate, however, will be resold and provide some return to the city. Exclusive of the above expenditures, the Interborough Rapid Transit Company and the New York Municipal Railway Corporation, which two companies will operate the new rapid transit lines entered into contracts and agreements involving large amounts in connection with rapid transit work. While exact figures are not at hand as to the amounts involved, it is roughly estimated that the two companies had expended and were under obligation to the amount of $35,000,000 all told for construction work upon company owned lines, making the total of construction contracts let by the city and the companies for all work in the neighborhood of $231,000,000. In addition, the two operating companies have authorized expenditures for some $20,000,000 for equipment which under the dual system contracts they must supply. The major portion of the Interborough lines will be in operation by the end of this year. Of the city-owned lines for operation by the New York Consolidated Railroad Company of Brooklyn, it is believed that a part and possibly all of the Broadway subway in Manhattan will be in operation.

MISCELLANEOUS

Mayor Seizes Coal for Poor.

Des Moines, Ia.—By order of mayor John MacVicar the police seized a carload of coal in the Northwestern railroad yards for delivery to the poor of the city. The mayor informed the railroad and the Bloomfield Coal Company, owners, that the coal was seized "by virtue of dire necessity, in accordance with the law." A check paying for the coal at prevailing wholesale rates was mailed to the coal company. Mayor MacVicar, in a statement, said he would submit evidence to the grand jury which, it is alleged, points to a combination on the part of mine owners to ship coal out of Polk county to maintain high prices here. The mayor said he had evidence sufficient coal is available to relieve the shortage here, but it is being withheld from retail dealers. Mayor MacVicar won a victory out of court when he forced from representatives of wholesale coal dealers a promise that none of their product would be shipped out of Des Moines as long as there was a single destitute family in the city without coal. After the mayor had given notice that he would fight their injunction petition he issued a statement that unless assurances are given that the poor would be taken care of he would order the police to seize every car of fuel outbound from this city and would see to it that it was given out before injunctions could be brought. The plaintiffs then agreed to distribute the coal through the Associated Charities.

New Municipal Organ.

Fresno, Cal.—Fresno's $5,000 pipe organ was formally dedicated here at a concert in the Fresno Auditorium. Fresno is said to be the second city in California to have a municipal pipe organ, San Francisco being the first.

New City Market Opened.

Elizabeth City, N. C.—The new market house for Elizabeth City is now occupied, the last touches having been completed on the refrigerating system, and the stalls cleaned and put in order. City manager Commander had the market completed as promised by the first of the year. The market is situated at the intersection of three streets, with doors opening on each side, and is accessible from all parts of the city. It is near the water where the fish and oysters came in and near the country on that side where the vegetables and much of the meat comes from. It is built of solid stone, two stories in height, with basement for heating and a refrigerating plant. The arrangement and building plan are modern in every respect. Inside, the market place is divided into stalls on the main floor, there being twenty-four in all. Twelve of these are meat stalls, six for vegetables and six for fish and oysters. Each stall is fitted with a storage box with room for a large quantity of products. The refrigerator or storage box has in it coils connected with the main pipes of the refrigerating machine, and an insulated storage tank. By this means the compressing machine has only to be run about two hours in the morning and two in the afternoon in order to keep the temperature right. From each stall steps lead up to the second floor, where offices are arranged, each marketman having a separate office. The building has a concrete floor and is equipped with a steam heating system.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Jan. 10-13.—AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Annual convention, New York, N. Y. Secretary, J. C. Olson, Cooper Union, New York, N. Y.

Jan. 15.—AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Annual meeting, New York, N. Y. Secretary, F. A. Molitor, 35 Nassau Street, New York, N. Y.

Jan. 17-18.—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, New York, N. Y. Secretary, Charles Warren Hunt, 220 West 57th Street, New York, N. Y.

Jan. 18-19.—AMERICAN FORESTRY ASSOCIATION. Annual convention, Washington, D. C. Executive Secretary, P. S. Ridsdale, 1410 H Street, N. W., Washington, D. C.

Jan. 19.—AMERICAN SOCIETY OF ENGINEERING CONTRACTORS. Annual meeting, New York, N. Y. Secretary, J. R. Wemlinger, South Ferry Building, New York, N. Y.

Jan. 20.—WESTERN PAVING BRICK MANUFACTURERS' ASSOCIATION, Kansas City, Mo. Secretary, G. W. Thurston, 416 Dwight Bldg., Kansas City, Mo.

Jan. 23-25.—AMERICAN WOOD PRESERVERS' ASSOCIATION.—Annual meeting, New York City. Secretary, F. J. Angier, B. & O. Mt. Royal Sta., Baltimore, Md.

Feb. 5-12.—AMERICAN ROAD BUILDERS' ASSOCIATION. Seventh American Good Roads Congress and Eighth National Good Roads Show, Mechanics' Hall, Boston, Mass. Secretary, E. L. Powers, 150 Nassau street, New York City.

Feb. 7-15.—TENTH CHICAGO CEMENT SHOW, Coliseum, Chicago, Ill. Secretary, Blaine S. Smith, 210 South La Salle Street, Chicago.

Feb. 8-10.—AMERICAN ASSOCIATION OF ENGINEERS. National convention, Hotel La Salle, Chicago, Ill. Headquarters, 29 La Salle Street, Chicago.

Feb. 8-10—AMERICAN CONCRETE INSTITUTE. Hotel La Salle, Chicago, Ill. Secretary, Harold D. Hynds, 1418 Walnut Street, Philadelphia, Pa.

Feb. 12-14—AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Chicago, Ill. Secretary, E. S. Hanson, 538 South Clark Street, Chicago, Ill.

Feb. 19-24.—SOUTHWESTERN CONCRETE ASSOCIATION. Annual meeting and concrete show, Convention Hall, Kansas City, Mo. Chairman, Show Committee, Chas. A. Stevenson, 1433 West 10th Street, Kansas City, Mo.

May 8-10.—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting, Washington, D. C. Secretary-treasurer, Franklin H. Wentworth, 87 Milk Street, Boston, Mass.

Nov. 12-16.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, 469 Transportation Building, Chicago, Ill.

American Association for the Advancement of Science.

The sixty-ninth meeting of this association was held at New York City, Dec. 26-30. The meetings of Section D, Engineering, were held Thursday and Friday at Columbia University and at the Automobile Club of America.

Papers were presented at the Thursday morning meeting of the association, dealing with the general topic of sanitation as follows: "The Treatment of Public Water Supplies," Nicholas S. Hill, Jr.; "The Disposal of Sewage by Dilution in New York Harbor Waters," by D. D. Jackson and R. H. Brown; "Pure Water and the Public Health," by George A. Johnson; "Recent Developments in the Design of Garbage Disposal Plants," by Gustave R. Tuska; "The Sterilization of Tannery Wastes," by D. D. Jackson and A. M. Buswell; "The Situation Regarding the Main Drainage of New York City," by Kenneth Allen.

In the afternoon at the meeting held at the Automobile Club of America, the subject of highway engineering education was discussed, the following papers being presented: "The Value of a Training in the Humanities for Engineers," by Nelson P. Lewis; "What Is Best in Engineering Education," by H. H. Higbie; "Essential Qualifications of Highway Engineers for State, County and Municipal Departments," E. A. Stevens, commissioner of highways of the State of New Jersey, Trenton, N. J.; "The Objects of the Educational Campaign of the National Automobile Chamber of Commerce," Alfred Reeves, general manager, National Automobile Chamber of Commerce, New York City; "Highway Engineering Electives in the Fourth Year of Civil Engineering Courses," Hector J. Hughes, professor of civil engineering, Massachusetts Institute of Technology, Cambridge, Mass.; "The Need for Highway Engineering Courses in Civil Engineering Curricula of Western Universities," T. R. Agg, professor of highway engineering, Iowa State College, Ames, Iowa; "Limitations of Field and Laboratory Work in Highway Engineering in Civil Engineering Curricula," C. S. Farnham, assistant professor of civil engineering, Yale University, New Haven, Conn.; "Subjects Recommended for Inclusion in Civil Engineering Courses to Qualify Graduates to Enter the Field for Highway Engineering," Arthur H. Blanchard, consulting highway engineer, New York City.

Highway Engineering was the subject under discussion at the evening session. Papers were presented at the meeting, which was a joint session with the Automobile Club of America, The National Highways Association, The Motor Truck Club of America, The National Automobile Chamber of Commerce and the Citizens' Street Traffic Committee of Greater New York, as follows: "The Interrelations of Seaport, Railroad and Highway Terminals," Calvin Tomkins, New York City; "Rotary Traffic: Accomplishments and Possibilities," William P. Eno, chairman, Citizens' Street Traffic Committee of Greater New York, Washington, D. C.; "Recent Investigations of Tractive Resistance to Motor Trucks on Roads and Pavements," A. E. Kennelly, professor of electrical engineering and director of the research division of the Department of Electrical Engineering, and O. R. Schurig, instructor in Electrical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.; "Speed Governors for Motor Trucks," Theodore Douglas, president, Duplex Engine Governor Company, Inc., Brooklyn, N. Y.; "Factors Controlling Maximum Overall Dimensions of Motor Trucks," Alfred F. Masury, chief engineer, International Motor Company, New York City; "Traffic Census Analysis," William H. Connell, chief of the Bureau of Highways and Street Cleaning, Philadelphia, Pa.; "The Most Satisfactory and Economical Pavement for Parkway Drives," Samuel Whinery, civil engineer, New York City; "Present Status of Preliminary Location and Mappings of National Highways Proposed by the National Highways Association," Charles Henry Davis, president, National Highways Association, Cambridge, Mass.; "Possible Variations of Physical Properties of Rock from One Quarry," Charles P. Berkey, associate professor of geology, Columbia University, New York City; "Stone and Concrete Foundations from the Standpoint of Efficiency and Economy," George C. Warren, president, Warren Brothers Company, Boston, Mass.; "Present Status of Bituminous Surfaces on Gravel Roads," John R. Rablin, chief engineer, Metropolitan Park Commission, Boston, Mass.; "Value of Physical Tests on Bituminous Aggregates," Prevost Hubbard, Chemical Engineer, U. S. Office of Public Roads and Rural Engineering, Washington, D. C.; "Proportions of Ingredients of Bituminous Mortars Used for Fillers," Philip P. Sharples, manager, General Tarvia Department, The Barrett Company, New York City; "Present Status of Physical Tests for Granite Blocks," C. D. Pollock, consulting engineer, New York City; "Joint Fillers for Granite Block Pavements," Herman H. Schmidt, chief engineer, Bureau of Highways, Borough of Brooklyn, New York City; "The Real Sources of Trouble in Brick Pavements," Maurice B. Greenough, consulting engineer, National Paving Brick Manufacturers' Association, Cleveland, Ohio; "Recent Developments in Details of Construction of Brick Pavements on Green Concrete Foundations and Sand-Cement Superfoundations," William C. Perkins, chief engineer, Dunn Wire-Cut Lug Brick Company, Conneaut, Ohio; "The Causes of Cracks in Cement-Concrete Pavements," A. T. Goldbeck, engineer of tests, U. S. Office of Public Roads and Rural Engineering, Washington, D. C.; "A Condition Survey of Concrete Roads in the United States," A. N. Johnson, consulting engineer, Portland Cement Association, Chicago, Ill.; "The Necessity for Adequate Methods of Waterproofing in Road Construction," C. J. Morrison, chief engineer, Meyer, Morrison and Company, Inc., New York City; "Columbia River Highway" (illustrated by motion pictures), George C. Warren, president, Warren Brothers Company, Boston, Mass.

New England Waterworks Association.

The Annual meeting of this Association will be held at Hotel Brunswick, Copley Square, Boston, Wednesday, January 10, 1917.

The Executive Committee will meet at the Headquarters, Tremont Temple, at 11.00 a. m. and at 1.00 p. m., lunch will be served at Hotel Brunswick, Copley Square. In the afternoon, there will be an address by Edward C. Niles, Chairman of Public Service Commission of New Hampshire. This will be followed by a paper—"The First Slow Sand Filter in the State of Maine," (ills.) by Henry Richards, trustee, Gardner Water District, Gardner, Maine. There will be a discussion by A. T. Safford, Lowell, Mass., and others.

The regular order of business is: Report of the Secretary; Report of the Treasurer; Report of the Editor; Report of Auditing Committee; Annual Address of the President; Election of Officers—Report of Tellers appointed to canvass ballots.

North Carolina Municipal Association.

The ninth annual meeting of the North Carolina Municipal Association will be held in Raleigh at the chamber of commerce rooms Tuesday and Wednesday, January 9 and 10.

The program for the session follows:

Tuesday, January 9.—Meeting called to order by the president, Mayor T. J. Murphey, of Greensboro, N. C. Invocation by Rev. C. P. Willcox, Rector St. Saviour's church, Raleigh. Address of Welcome—Mayor Jas. I. Johnson, of Raleigh. Response—Mayor B. S. Skinner, of Durham. Address: "Municipal Government in Ohio"—Dr. A. R. Hatton, of Cleveland, Ohio.

Three O'clock P. M.—Report of special legislative committee appointed to draft general laws for submission to the legislature chartering and financing cities and towns of the state. Report of officers and committees of the association and general discussion of same. Banquet at Yarborough House by chamber of commerce of the city of Raleigh at 7:30 p. m.

Wednesday, January 10, 11 a. m.—Address—"Home Rule for our Cities and Towns Under State Constitution as Amended"—W. S. Wilson, Legislative Reference Librarian, Raleigh. Address—"Is Street Paving a Financial as Well as Civic Asset"—Mayor Fred I. Sutton, Kinston.

Three O'clock P. M.—Discussion on "Fire Prevention and Protection," led by Jas. R. Young, Insurance Commissioner; Mayor J. D. McNeill, Fayetteville; "Parks and Playgrounds"—Mayor O. B. Eaton, Winston-Salem.

Business Session. Election of officers. Selection of next place of meeting. Final adjournment.

New Jersey Mosquito Extermination Association.

The whole field of mosquito extermination work will be dealt with in addresses January 25 and 26 at the fourth annual meeting of the New Jersey Mosquito Extermination Association at Atlantic City, N. J. Reports will be submitted on the work in the dozen counties of the state where extermination is being carried on.

Salt marsh drainage systems will be discussed by five speakers, including John W. Dobbins of Newark and James E. Brooks of Glen Ridge. Upland mosquito control will be told of by Wilbur Walden and W. V. Becker, both of Newark. Surgeon General W. C. Gorgas of the United States army will deal with methods in tropical countries and the malaria problem of the South will be told of by Assistant

(Continued on page 23.)

PERSONALS

Brennan, Francis J., has been appointed street commissioner for a three-year turn by Mayor Curley, of Boston, Mass.

Durham, Henry Welles, has severed his connection with Bergen County, N. J., which he served as county engineer. He continues his consulting engineering practice, in which he is associated with Percival Robert Moses, at 366 Fifth avenue, New York City.

Owens, Joseph J., Lieut. of Truck Co. No. 3, of Newark, N. J., died at the City Hospital in a collision between the truck and the salvage corps automobile, when the apparatus was reporting to an alarm of fire.

Travilla, James C., of St. Louis, Mo., has become connected with The Dunn Wire-Cut Lug Brick Company of Conneaut, O., in the capacity of consulting engineer. Mr. Travilla is a well-known municipal engineer. He is a graduate in the civil engineering course of the University of Pennsylvania, where he also took a post-graduate course. During his professional career he has been in the engineering department of the Missouri Pacific railroad at St. Louis; assistant engineer in the water department, St. Louis; for several years in charge of the estimating and drafting division of the street department, St. Louis; superintendent of the street department; street commissioner under Mayors Rolla Wells and Frederick H. Kreisman. Mr. Travilla resigned in 1913 as street commissioner of St. Louis, and until 1916 had supervision and direction of the expenditure of $1,000,000 for good roads in Tarrant county, Texas; he also directed road work from proceeds of bond issues in other Texas counties. In March, 1916, Mr. Travilla was appointed consulting and associate engineer by the County Court of St. Louis county, Missouri, for a $3,000,000 road system. This work was stopped by a ruling of the Supreme Court declaring certain road statutes invalid, and December 1, 1916, Mr. Travilla joined the engineering department of the Dunn Company.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Construction work is to begin soon on the new SEWAGE TREATMENT PLANT, of Alliance, O. The consulting engineer for this project is R. Winthrop Pratt, Hippodrome Building, Cleveland, O.

Franklin Park, Ill., is to improve its WATER SUPPLY system by the construction of a deep well. The engineers who prepared the plans were Ewing and Allen, 111 West Monroe street, Chicago, Ill.

The city of Plainview, Tex., in developing its PAVEMENT improvements, has retained Henry Exall Elrod, Interurban building, Dallas, Tex., as consulting engineer.

The city council of Pittsburgh, Pa., is considering the STREET LIGHTING situation. It has retained H. O. Swoboda, Empire Building, Pittsburgh, as consulting engineer to make a preliminary investigation.

Before awarding a STREET LIGHTING CONTRACT for five years to the Utica Gas & Electric Co., the city of Utica, N. Y., had the rates and other aspects of the situation investigated by Mr. William Lispenard Robb, consulting engineer and head of the department of electrical engineering of Rensselaer Polytechnic Institute, Troy, N. Y.

SANITARY SEWERS and a DISPOSAL PLANT are to be constructed by the city of New Cordell, Okla. The plans and specifications for the work have been completed by the Benham Engineering Company, Colcord Building, Oklahoma City, Okla.

The city council of Merrill, Wis., proposes to install a new ornamental STREET LIGHTING SYSTEM. Plans prepared by A. J. Sweet, consulting engineer, 218 Palace Theater building, Milwaukee, Wis., have been adopted.

A WATERWORKS SYSTEM is to be constructed by the town of Dakota City, Ia. The plans and specifications for the projected improvement have been prepared by Lawrence W. Cox, engineer, 1316 East 12th street, Des Moines, Ia.

Decatur, Ill., is to continue the development of its SEWAGE DISPOSAL projects. Samuel A. Greeley, 64 West Randolph street, Chicago, Ill., and Langdon Pearse, Karpen Building, 900 South Michigan avenue, Chicago, Ill., the consulting engineers who made the original sewage disposal experiments, have been retained to assist P. T. Hicks, city engineer, in the design of an intercepting sewer and in the solution of other general problems as may arise.

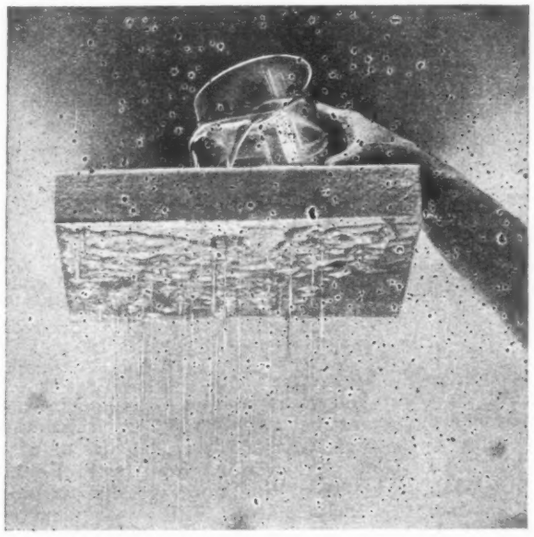
NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

"FILTROS" POROUS MEDIUM

For Air Diffusing and Filtration.

The recent development of the activated sludge method of sewage treatment in a number of experimental plants and large installations has necessitated the improvement of some means of air diffusion. The process depends for its effectiveness on the extent of surface presented by the air used—and consequently on the minuteness of the air bubbles. This means the breaking up of the air by a diffusing or porous medium which, in order to give best results, must be, among other things, uniform, able to sustain the normal pressures of the operation, fine in texture and capillarity and inert chemically towards the materials handled.



ILLUSTRATING THE POROSITY OF FILTROS. LIQUID PASSING THROUGH A SATURATED PLATE ON THE SURFACE OF WHICH IT IS POURED.

In almost all of the activated sludge installations the diffusing medium used has been Filtros, this material having been furnished to plants at Milwaukee; Escanaba, Mich.; Houston and Paris, Texas; Cleveland; Baltimore; Urbana, Ill. and the Sanitary District of Chicago; the first four treating upwards of one million gallons of raw sewage daily, the others one hundred thousand gallons or more daily. Pasadena, Cal.; Brockton, Mass.; San Marcos, Texas; Toronto, Canada; and Lawrence, Mass., have made installations for small experimental purposes. Filtros is made from a pure crystalline silica, carefully ground and screened to the proper mesh for its particular grade of porosity. This material is thoroughly mixed with a small percentage of an artificial compound silicate. The mixture is screened and pressed and the ware is finally dried and burned. Every process is carefully controlled according to definite standards developed after a number of years of research and experiment.

The ware is made in a number of shapes and grades of porosity. The standard size plate is 12 x 12 x 1 1-2 ins, and this is in use in all the activated sludge tanks employing the Filtros medium except at Baltimore, where discs 6" in diameter and 1" thick are used. While all grades of Filtros are approximately of the same porosity expressed in per cent of voids, the pores of the various grades are different in size and number per square inch. The number of cubic feet of air per square foot of area that at two inches of water pressure will pass through a dry flat plate 1-1/2" thick in one minute varies from 12.0 to 0.50. The grade principally in service in the activated sludge tanks now in operation in this country is the 5-R, with the 12.0 cubic feet of air passage under the given conditions and a porosity by voids of 40.00 per cent.

In the early use of Filtros in the activated sludge plants, some difficulties were experienced apparently due to softening of the material and to non-uniformity of air diffusion. In some instances these conditions were caused by defects in the plates themselves—in most, by the inadequate treatment of structural details of the plants. In the latter cases softening and breaking of the edges of the plates and leakage were caused by poor cementing of the joints and improper support of the plates. These conditions and consequent precautions are discussed elsewhere in this issue. Faults were discovered in some of the plates themselves, inasmuch as the first lots furnished were made primarily for filtering purposes rather than for air diffusers. At the new Rochester plant of the manufacturers, special attention has been given to their air diffusing properties and, as has been mentioned, absolute control governs every detail of every process, so that uniformity in structure and composition is attained within exceedingly close limits of permissible variation. In addition to this rigid accuracy of control in manufacture, every plate furnished for activated sludge service is thoroughly tested and rated for capacity and uniformity. Mr. T. Chalkley Hatton, of the Milwaukee Sewerage Commission, in his authoritative reports and papers on the activated sludge process, states that the new plates, when properly installed, are uniform enough and strong enough for the efficient operation of the process.

Filtros is inert towards acids, both organic and inorganic, with the exception of hydrofluoric acid. Lime solutions have practically no action on the material but sodium and potassium hydroxides disintegrate it eventually. Chemicals employed in water treatment do not affect it and Filtros, used alone or with a thin layer of sand, has been found an excellent medium for water filtration. Filtros is easily cleaned by back flushing with air or water. It has also been used effectively in the liquid chlorine treatment of water supplies.

The accompanying illustration serves to indicate the uniform porosity of the Filtros medium. A diagram showing the method of installation will be found on page 12 of this issue. Filtros is manufactured by the General Filtration Company, Inc., 325 Cutler Building, Rochester, New York.

BLAW BUCKETS.

In a Number of Types for All Kinds of Work.

In the whole line of Blaw Grab Buckets for excavating and dredging work, emphasis in design and construction is placed on maximum power behind the digging edge. This is accomplished by putting the preponderating weight near the cutting edges so as to give highest penetrating power. The exceptionally heavy jaws dig with a perpendicular thrust with the weight right over the cutting edge. The whole bucket is designed to be more massive than ordinarily, but it is not top-heavy, as the weight is distributed at a low point.

The Blaw buckets (formerly known as Dobbie buckets) are very simple in design and are constructed with the least possible wearing parts. The result is speedy and positive action in opening and closing and better resistance to breaking strains. The scoops are so designed and built as to eliminate the possibility of their getting out of alignment. There are no "S" bends in the cable and no exposed cables to collect wearing substances from the material handled. The straight rope reeving helps reduce cable maintenance costs. Proper means of lubricating are provided throughout.

The buckets are made in four main types, with a number of sizes in each. The standard type "C" bucket is used to handle sand, gravel, crushed stone, coal and similar bulk materials. Its comparative light weight makes it well adapted for use on locomotive cranes, light derricks, overhead mono-rail trolleys and similar installations. It is regularly equipped with high carbon digging lips, but manganese steel lips are supplied or forged steel teeth are fitted over the regular lips and bolted or riveted on the scoops, where required. This type is built in sizes from one-half yard up.

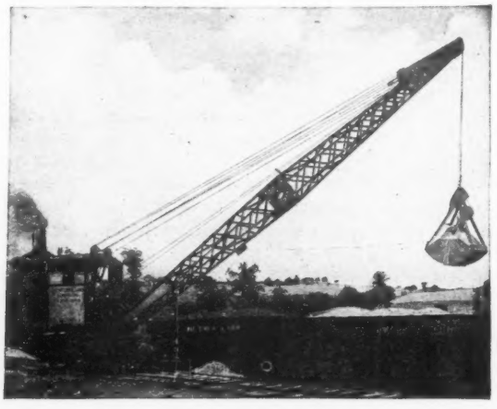
The standard type "S" bucket is a well-known "clean-up" and has deep hinges and extra wide scoops. It is used to handle sand, gravel and other like bulk material from barges and flats. It gathers material with a scraping action and is designed to obtain a maximum load from a very thin layer of material. It is regularly furnished with high carbon steel lips, with provision for manganese steel lips when required. It is slightly heavier than the type "C" bucket and is made in sizes from one yard up.

The standard type "E" excavating bucket is heavier and more rugged than the two other types mentioned. It is used to handle crushed stone and such materials as clay, packed sand, gravel and swampy materials from their natural beds. The scoops differ in design from those in either of the other two types, being formed of one continuous heavy plate for the sides and bottom, with heavy digging teeth or lips, as required. The reduction in dead weight and maintenance cost causes it to be used where formerly the light weight orange-peel bucket was required. This bucket is built in capacities of one-half yard and up.

The standard type "D" dredging bucket is the heaviest type built and is designed for the toughest and most obstinate dredging or excavating service. It is like the type "E," but with all details made much stronger and heavier. The sides and bottom of the scoop are formed of one continuous extra heavy plate with extremely heavy digging teeth.

The accompanying illustrations show a type "C" bucket and one on the job for the Sheesley and Janney Company, contractors, Snowden and Johnstown, Pa. The buckets described are made by the Blaw Steel Construction Company, Pittsburgh, Pa.

TYPE "C" BLAW BUCKET.



BLAW BUCKET AT WORK.

INDUSTRIAL NEWS

Cast Iron Pipe. — Chicago. — The award of 1,500 tons of pipe at St. Paul is understood to have been made to the National Cast Iron Pipe Company. New lettings announced include 1,600 tons at Sioux City, Iowa; 400 tons at Madison, Wis.; 250 tons at Portland, Ore., and 300 tons at Fort Wayne, Ind. Quotations: 4-inch, $44.50; 6-inch and larger, $41.50; class A, $1 extra. Birmingham.—Orders are being restricted to small quantities for filling in. Manufacturers must soon get new business or curtail operations. Fortunately the rise in price of pig iron came at the usually dull pipe-making season. Quotations: 4-inch, $39; 6-inch and upwards, $36; special sizes, $1 extra. New York.—Seasonable dullness prevails, although inquiry from private buyers has been considerably greater than usual for the last week in December. Prices are maintained. Quotations: 6-inch, class B and heavier, $41.50; class A, $42.50.

Lead.—Lead is dull, with the leading interest taking only February business, and that on the basis of average quotations for the month. Quotations: New York, 7.50 cents; St. Louis, 7.30 cents.

The Dunn Wire-Cut Lug Brick Company, Conneaut, O., announces that Mr. James G. Travilla of St. Louis, Mo., has become connected with the company in the capacity of consulting engineer. Mr. Travilla's record is summarized in the "Personals" column in this week's issue.

Stone Companies in New Village.—Arrangements have been completed for the incorporation of what is now known as South Amherst, Ohio, in the section occupied by the Cleveland Stone Co. and the Ohio Quarries Co. quarries. The new municipality will have 1,000 inhabitants, it is estimated.

Federal Truck for Road Marking.—J. F. Bowman, director of sales of the Federal Motor Truck Company, Detroit, Mich., announces that a Federal truck has been especially equipped by the California State Automobile Association, for use in marking and scouting roads in the Coast States. This latest addition to the extensive equipment of the association is especially equipped for long distant travel over desert roads. On the running boards by the driver's seat are two large tanks holding more than forty gallons, one for gasoline, and the other for water. A third tank is extended from the frame on the left side of the truck. It will carry five gallons of surplus oil. "With this equipment," says Mr. Bowman, "the truck will be able to travel from 400 to 600 miles without adding fuel or water. Its work during the next year will include marking as many of the unmarked highways and connecting roads of northern California and Nevada as it is possible to cover in that length of time."

Big Argentine Pipe Contract.—The technical commission appointed by the Argentine Republic to supervise the manufacture of the 65,000 tons of cast iron pipe awarded the United States Cast Iron Pipe Company, has arrived in this country. This is the largest single pipe contract placed by Argentina, and the first to be awarded to the United States, as well as one of the largest single cast iron pipe orders

in the history of the industry. Competition for this tonnage was keen between European and American founders. Upon the opening of bids it was found that the bid of Allied British Founders was 2 per cent lower than the company here, which apparent advantage was offset by the refusal of the British company to bid in accordance with several conditions demanded by the Argentine Government, and an analysis finally showed the American bid to represent a price $60,000 under the British totals. The length of pipe approximates 2,500 miles.

Paving Equipment for Cuba.

What is said to be one of the largest single shipments of paving equipment on record is that just made to Messrs. Torrance & Portal, of Havana, Cuba, who have secured extensive paving contracts in Havana and Cienfuegos.

The shipment made by the Iroquois Works of The Barber Asphalt Paving Company, Buffalo, N. Y., consisted of [illegible] cars routed by way of Key West, Florida, carrying two three-unit asphalt plants, two 2,000 gallon and one 1,000 gallon steam heated melting ketties, four tandem rollers, two portable boilers and engines, firewagons, paving tools, etc. The accompanying illustration shows a view of the shipment.

Contracts already secured by the Havana firm for paving in which Trinidad lake asphalt will be used, total about 400,000 square yards. One of the Iroquois plants is to be located at Havana and the other at Cienfuegos.

NEWS OF THE SOCIETIES

(*Continued from page 20.*)

Surgeon General H. R. Carter of the United States Public Health Service. The meaning of extermination is the subject assigned to Dr. Ralph H. Hunt of East Orange. Other men of national reputation will treat various phases of the problem.

Chicago Cement Show.

With the Coliseum main floor, balcony and annex filled with exhibits of concrete products and concreting equipment, the Tenth Chicago Cement Show offers architects, engineers, contractors and dealers the best opportunity the Show has yet offered to study materials, machines and products which are representative of the best and latest in the cement industry. The exhibits, occupying 289 spaces, are more representative of standard and novel concreting equipment and the products are more illustrative of the possibilities of concrete than heretofore. The use of the balcony instead of the Armory should enable visitors to make comparisons with greater facility.

The Joint Exhibit of cement companies at the coming show will be a comprehensive demonstration of the uses of concrete, and particular attention will be given products in the making.

Among the more novel of the machinery exhibits is the display of the Pneumatic Concrete Placing Co. By means of this equipment concrete has been placed in forms more than a half-mile distant from the place of mixing. In this exhibit concrete will be driven fully 200 feet through pipes.

Texas Good Roads Association.

The annual midwinter meeting of the Texas Good Roads Association will be held at Austin on January 17 and 18. This date was decided upon following a conference of the secretary with Howard Bland of Taylor, president of the association, who has been instructed by other members of the directorate to fix that date.

One of the principal matters to be discussed at the meeting will be the proposed bill to create a highway department for Texas, a committee having been instructed by the last meeting to prepare such a bill.

Florida Engineering Society.

The Florida Engineering Society, organized at a meeting at Jacksonville, Dec. 21, will seek to get the next legislature to enact a law requiring those desiring to practice any one of the different branches of the profession in Florida to show necessary qualifications before being granted a permit.

This will be the chief object of the newly-organized body in eliminating objectionable practitioners and those not qualified to do engineering work. According to officers of the society, such a step will tend to uplift the profession and protect the interests of clients.

The society was permanently organized at the second session held in the assembly room of the Hotel Seminole. Provision for the officers and board of directors was made in the constitution recommended by the special committee appointed by Temporary Chairman J. R. Benton of Gainesville, the preceding night, and the attendants immediately set to work to nominate and elect the board.

L. D. Smoot, commissioner of public works of Jacksonville, was elected president; W. P. Darwin, Jacksonville, first vice president; R. E. Chandler, Gainesville, second vice president; J. R. Benton, Gainesville, secretary, and H. D. Mendenhall, Lakeland, treasurer.

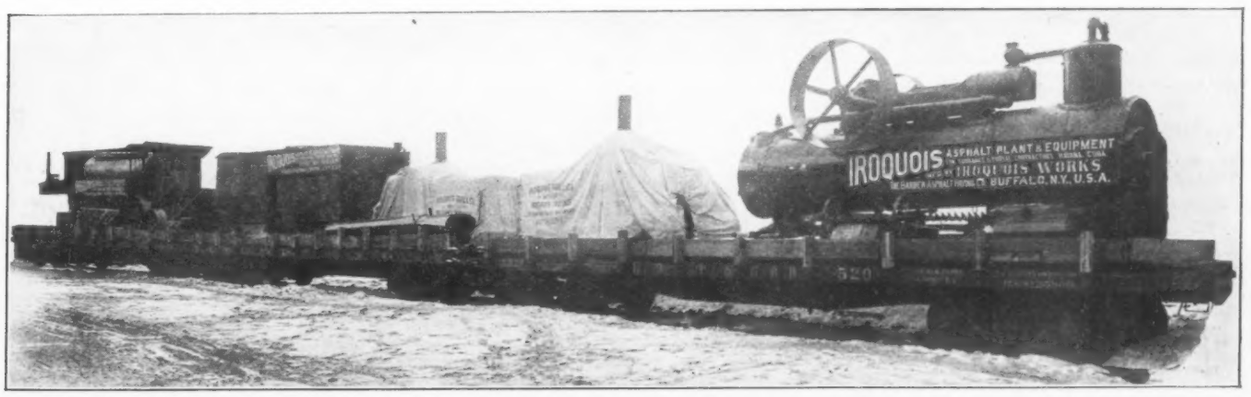
The board of directors consists of the following members: Ben Thompson, Tampa, and G. B. Hills, Jacksonville, to serve one year; A. D. Stevens, Jacksonville, and Ben Johnson, Miami, to serve two years, and W. F. Cocke, Tallahassee, and R. P. Martin, Tampa, to serve three years.

President Smoot then appointed committees on by-laws and membership, after which the body decided to hold an extra convention at Tampa on February 2 and 3, for the purpose of adopting the by-laws recommended by the committee and to perfect the plan of securing desired legislation.

The society started with a charter list of eighty-four members, including practitioners in all branches of engineering. The qualifications for membership are similar to those of the national societies for civil, mechanical, mining, chemical and naval engineers.

New Jersey State League of Municipalities.

The second annual convention of the State League of Municipalities will be held in Trenton, N. J., January 9 and 10, and Mayor Frederick W. Donnelly, president of the association, is completing the arrangements. At the first day's session papers on municipal government will be read by Mayor Donnelly, Mayor Seger of Passaic, Mayor Ellis of Camden and Mayor Calkins of Plainfield. The general topic, "Municipal Taxation and Finance," will be discussed by Lawson Purdy, Assemblyman Arthur N. Pierson and Frederick A. Cleveland.



RECORD SHIPMENT OF PAVING EQUIPMENT, ON WAY TO CUBA.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS.	
Ind.,	Monticello	10 a.m., Jan. 5	Constructing county line roads	A. G. Fisher, Co. Aud.
W. Va.,	Charleston	Jan. 5	Brick or concrete pavements, $90,000 available	F. G. Burdette, Engr., Court House.
Wash.,	N. Yakima	2 p.m., Jan. 6	Grading country road	C. E. Barrett, Co. Aud.
Ind.,	Green Castle	2 p.m., Jan 6	Grading, curbing and paving roads	J. M. Allen, Co. Aud.
Iowa,	Grundy Center	8 p.m., Jan. 8	Grading, paving and curbing	E. V. McBroom, Town Clk.
Fla.,	Bradentown	Jan. 8	20 miles hard surface road	R. M. Cantey, Engr., Sarasota
Ind.,	Williamsport	2 p.m., Jan. 8	Constructing four miles of road	D. H. Moffit, Co. Aud.
O.,	Warren	1 p.m., Jan. 8	Slag roads, cost $15,000	R. E. Hempel, Engr.
Minn.,	St. Paul	10:30 a.m., Jan. 8	4,255 cu. yds. crushed stone or gravel	H. W. Austin, Pur. Agt.
D. C.,	Washington	Jan. 8	1,50,000 repressed vit. paving blocks	Pur. Of., Room 320, Dist. Bldg.
Ind.,	Lebanon	Jan. 8	Paving with brick; cost, $25,000	W. F. Smith, City Clerk.
Ala.,	Courtland	noon, Jan. 8	Constructing 5 miles of macadam road	J. C. Kumpe, Judge of Prob'te.
Cal.,	Bakersfield	Jan. 9	20 miles broken stone road construction	F. E. Smith, Clk., Co. Supvrs.
Cal.,	Modesto	Jan. 9	14.4 miles concrete highways	E. H. Annear, Co. Engr.
Ind.,	Indianapolis	10 a.m., Jan. 10	Paving Meridian St.	B. J. T. Jeup, City Engr.
Md.,	Baltimore	Jan. 10	Grading and paving with granite and other surfacing; concrete highway bridge 80 ft. long	H. K. McCay, Harbor Engr.
N. J.,	Freehold	Jan. 10	25,000 sq. yds. warrenite on concrete	G. D. Cooper, Engr., Red Bank.
Ia.,	**Independence**	**Jan. 10**	**Paving 31 blocks, cost $100,000**	**City Clerk.**
Wash.,	Seattle	Jan. 10	Grading and draining two miles of road	C. D. Nims, Co. Engr., South Bend.
Ia.,	**Algona**	**8 p.m., Jan. 11**	**40,000 sq. yds. first-class pavement, and 40,000 ft. combined curb and gutter**	**T. S. De Lay, Engr., Creston, Ia.**
Ind.,	New Albany	10 a.m., Jan. 11	Constructing road	Emile Dupaquier, Co. Aud.
Kan.,	Kansas City	Jan. 11	Improving county roads	R. L. McAlpine, Co. Surveyor.
N. D.,	Valley City	2 p.m., Jan. 13	Road construction, involving 101,000 cu. yds. excavation and 6 miles of turnpiking	C. A. Myhre, Co. Surveyor.
Ind.,	Indianapolis	10 a.m., Jan. 16	Constructing gravel road	L. K. Fesler, Co. Aud.
Pa.,	Wilkes-Barre	noon, Jan. 16	45,000 sq. yds. sheet asphalt, 4,400 sq. yds. brick pavement and 35,000 ft. stone or concrete curb	B. K. Finch, City Engr.
N. Y.,	Amsterdam	Jan. 16	35,000 sq. yds. asphalt block pavements	E. H. Prentice, City Engr.
Ala.,	Linden	Jan. 18	10 miles sand-clay or gravel roads	A. L. Hosy, Judge of Probate.
Ind.,	Auburn	10 a.m., Jan. 18	Constructing gravel road	S. P. Nelson, Co. Aud.
O.,	Kent	Mar. 18	17,500 sq. yds. monolithic brick, concrete or asphaltic concrete, curbs, etc.	Fred Bechtle, Village Clerk
Fla.,	Lakeland	Jan. 19	13,800 sq. yds. sheet asphalt, asphalt block or brick, curbs and gutters	J. W. Turner, Engr.
N. J.,	Keyport	11 a.m., Jan. 19	Warrenite on concrete; cost, $65,000	J. M. Corlies, Dir. Board of Freeholders.
Ind.,	Connersville	2 p.m., Jan. 20	Constructing concrete roads	Glen Zell, Co. Aud.
Cal.,	Upland	7:30 p.m., Jan. 22	Grading and oiling and surfacing	C. P. Fuller, City Clerk.
Ind.,	Indianapolis	10 a.m., Jan. 23	Constructing gravel road	L. K. Fesler, Co. Aud.
La.,	Lake Charles	Jan. 25	Additional brick paving construction	City Engr.
O.,	Ravenna	Jan. 28	1,700 sq. yds. of brick pavement, slag base and stone or concrete curb	S. B. Horsfall, Dir. Pub. Serv.
Ind.,	Lebanon	Jan. 29	Thirteen blocks brick pavement, cost $25,000	Walter Whitecotton, City Eng.
O.,	Urbana	Feb. 1	Paving West Jefferson Rd.	W. S. Coffey, Co. Aud.
Ia.,	**Cedar Rapids**	**Feb. 1**	**Paving thirteen blocks; cost, $90,000**	**T. F. McCauley, Engr.**
Ill.,	Cicero	Feb. 1	8,290 sq. yds. asphaltic concrete pavement, and 5,800 feet concrete curb	Lewis Mangreig, Engr.
N. J.,	Neshanic	Feb. 6	12,000 sq. yds. macadam pavement	C. Van Cleef, Clerk, Twp. Committee.
Ill.,	Virginia	April 1	Road improvement; cost, $14,000	Co. Clerk.
			SEWERAGE.	
Wis.,	Marshfield	3 p.m., Jan. 5	Sewage disposal plant	J. F. Druar, Engr., Commercial Bldg., St. Paul.
Minn.,	Cambridge	1 p.m., Jan. 5	Drainage ditch, cost $13,000	G. S. Smith, Co. Aud.
Ia.,	Garner	Jan. 5	Drainage ditch, requiring 60,000 ft. 6 to 28-in. tile and 93,000 cu. yds. of excavation	E. P. Hanson, Co. Audr.
O.,	Cleveland	11 a.m., Jan. 6	3,100 feet 12 to 24-inch vitrified tile and 20,000 cubic yards drainage ditch excavation	W. A. Stinchcomb, Co. Surv.
Utah,	Salt Lake City	10 a.m., Jan. 8	Constructing outlet sewer	S. Q. Cannon, City Engr.
O.,	Toledo	noon, Jan. 9	Constructing local sewer	D. H. Goodwillie, Dir. Public Service.
O.,	Swanton	noon, Jan. 11	Constructing sewer	John F. Evans, Village Clerk.
O.,	Sidney	noon, Jan. 11	3.45 miles 6 to 12-in. sewers	C. B. De Weese, Dir. Public Service.
Wis.,	Milwaukee	2 p.m., Jan. 11	13,500 feet 72-inch sewer in tunnel and 577 feet 12 and 30-inch concrete and tile sewers	J. H. Fowles, Secy. Sewerage Commission.
Ill.,	**Park Ridge**	**Jan. 11**	**Constructing sewer system and water mains**	**E. L. Shaw, Monadnock Block, Chicago, Ill.**
O.,	Stockton	Jan. 11	Constructing sewer	H. McKechnie, City Engr.
N. Y.,	New York	10:30 a.m., Jan. 12	Sewage pumping plant at Health Dept. grounds near Jamaica	Board of Health, Center and Walker Sts.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Mo.,	Albany	Jan. 15.	Constructing sewer system and disposal plant	E. T. Archer & Co., Engrs., New England Bldg., Kansas City, Mo.
Ill.,	Berwyn	Jan. 15.	Sewer construction; cost, $20,000	B. Strutzenberg, City Engr.
Ill.,	Alton	2 p.m., Jan. 15.	Constructing trunk sewer	P. H. Landon, City Engr.
Ind.,	Lafayette	Jan. 17.	8.5 miles 8 to 12-in. sewer, cost $55,000	H. B. Overesch, Jr., City Engr.
Iowa,	Muscatine	7.30 p.m., Jan. 18.	Constructing sewers	C. H. Young, Engr., City Hall.
O.,	Alliance	noon, Jan. 18.	Improving sewage treatment plant and laying sewers	R. Winthrop Pratt, Engr., Hippodrome Bldg., Cleveland, O.
Minn.,	Gaylord	1 p.m., Jan 20.	Constructing tile drains, cost $7,000	Fred Hoppenstedt, Co Aud.
O.,	Amherst	Jan. 23.	Constructing sanitary sewers; cost, $8,000	A. G. Menz, City Clerk.
Ind.,	LaFayette	Jan. 24.	8½ miles 8 to 12-inch sewer	E. J. Vaughan, Clerk.
Minn.,	Crookston	10 a.m., Jan. 25.	Constructing drainage ditches, cost $8,000	H. J. Welte, Co. Aud.
Ill.,	Cicero	Feb. 1.	1,033 feet of sewers, cost $2,100	Lewis Mongreig, Engr.
Ia.,	Rockwell City	Feb. 5.	Disposal plant; $10,000 available	F. E. Burnham, City Engr.
Wis.,	Chilton	Mar. 6.	Constructing sewer system, cost $22,000	Jerry Donohue, Engr., Sheboygan, Wis.
India,	Calcutta	2 p.m., June 1.	Storm water pumping plant	C. C. Chatterjee, Sec. Corp. of Calcutta.

WATER SUPPLY.

Wis.,	Marshfield	3 p.m., Jan. 5.	Digging well and furnishing pump	J. F. Druar, Engr., Commercial Bldg., St. Paul.
Minn.,	St. Paul	10.30 a.m., Feb. 5.	Constructing high service reinforced concrete covered reservoir	H. W. Austin, Purchasing Agt.
N. Y.,	New York	2 p.m., Jan. 5.	Furnishing and laying water mains; furnishing copper wire and corporation cocks	Corporation Counsel, Room 2351, Municipal Bldg.
O.,	Cleveland	noon, Jan. 5.	Furnishing cast iron pipe and specials	Comr. of Water.
Ia.,	Webster City	Jan. 8.	Water and light plant; cost, $18,000	H. G. Vollmer, City Mgr.
La.,	Independence	Jan. 9.	Oil engines, pumps, steel tower and tank, reservoir, pumping engine and station, hydrants, valves, pipe, etc.	W. H. Wilson, Mayor.
Mass.,	Boston	noon, Jan. 9.	Furn. 5,550 water meters, 70,000 lbs. composition casting, 2,625 tons c. i. pipe and specials and 150 tons gate boxes	Patrick O'Hearn, Acting Supt. of Supplies.
N. Y.,	New York	2 p.m., Jan. 10.	Furnishing pig lead	Corp. Counsel, Mun. Bldg.
Colo.,	Denver	Jan. 10.	Furnishing butterfly and cylinder gates for Flathead project	U. S. Reclamation Service
Ill.,	Park Ridge	Jan. 11.	Constructing water mains and sewers	E. L. Shaw, Monadnock Block, Chicago, Ill.
D. C.,	Washington	Jan. 11.	Pig lead and other supplies	Gen. Pur. Officer, Pan. Canal.
O.,	Geneva	Jan. 15.	Sedimentation tank and filter plant; cost, $6,000	J. Reeves, Supt. Gen. Water Co.
Ia.,	Walnut	2 p.m., Jan. 18.	Drilling artesian well	C. P. Chase, Engr., Clinton, Ia.
N. J.,	Atlantic City	Jan. 18.	114 high pressure fire hydrants	L. Van Gilder, City Engr.
Tex.,	Brownsville	Feb. 1.	One 6-in. and two 8-in. centrifugal pumps, direct connected to motors	F. H. Williams, City Mgr.
Cal.,	Coalinga	Feb. 1.	Constructing water system, cost $100,000	F. G. Dessery, Engr., Central Building.
Wis.,	Chilton	Mar. 6.	Constructing water works system, cost $45,000	Jerry Donohue, Engr., Sheboygan, Wis.
O.,	Mt. Vernon	April 1.	Installing meters; $20,000 available	C. G. Snow, Dir. of Pub. Serv.
Ill.,	Gibson City	April 1.	Constructing water and light plant	City Clerk.

MISCELLANEOUS.

Ind.,	South Bend	Jan. 5.	Comb. patrol and ambu. wagon; $2,500 available	Board of Public Safety.
Ind.,	Huntington	3 p.m., Jan. 5.	Constructing drainage ditch	George Hoch, Drainage Comr.
O.,	Cleveland	Jan. 6.	Constructing drainage ditch	W. A. Stinchcomb, Co. Surv.
Ind.,	La Fontaine	9 a.m., Jan. 6.	Constructing drainage ditch	W. H. Thomas, Constr. Comr.
Miss.,	Carthage	Jan. 8.	4.75 miles drainage construction	N. F. Wallace, Co. Clerk.
Mich.,	Detroit	noon, Jan. 9.	Leveling 80,000 sq. yds. of clay fill	R. A. Murdoch, Engr., 706 Free Press Bldg., Detroit.
Mich.,	Fremont	9 a.m., Jan. 9.	Constructing 17 miles of drain	Co. Drain Comr.
Ind.,	Peru	7:30 p.m., Jan. 9.	Constructing concrete wall	Pleasant Bell, Jr., City Clerk.
N. Y.,	Albany	noon, Jan. 9.	Hoists for Vischer Ferry's dam; cost, $10,000	W. W. Wotherspoon, St. Supt. of Public Works.
Ill.,	Rock Island	Jan. 10.	Concrete hollow tile storehouse and 350 ft. of railway	Commanding Officer, Rock Island Arsenal
N. Y.,	Brooklyn	Jan. 10.	Constructing elevated railway	Public Service Commission.
N. J.,	Atlantic City	Jan. 11.	Two Vim automobile trucks	L. Van Gilder, Engr.
Miss.,	Silver City	noon, Jan. 11.	230,000 yds. open ditch construction	J. H. Reed, Pres. Atchafalaya Drain. and Levee Dist.
Cal.,	Berkeley	10 a.m., Jan. 12.	Furnishing two 1-ton motor trucks	A. G. Briggs, City Clerk.
O.,	Columbus	noon, Jan. 15.	Sale of garbage tankage and grease	G. A. Borden, Pres., Board of Purchase.
Ind.,	Williamsport	2 p.m., Jan. 15.	Constructing drainage ditch	J. Rupert Gregory, Drainage Commissioner.
Tenn.,	Memphis	Jan. 15.	Furnishing 25,000 tons riprap stone	U. S. Engr. Office, Cus. House.
La.,	New Orleans	Jan. 16.	Constructing bulkhead at Southwest Pass, Mississippi River	U. S. Engr. Office, Custom House
N. Y.,	Albany	noon, Jan. 17.	Constr. temporary terminal warehouses at several points along canal	W. W. Wotherspoon, St. Supt. of Public Works.
Minn.,	Henderson	Jan. 17.	Constructing two drainage ditches	F. Hoppenstedt, Co. Aud.
Ia.,	Glenwood	1 p.m., Jan. 18.	5.36 miles ditch construction	R. E. Humphrey, Co. Aud.
Tex.,	Houston	noon, Jan. 22.	Constructing warehouse at Turning Basin	E. E. Sands, City Engr.
Iowa,	Rockwell City	1 p.m., Jan. 23.	Constructing drainage ditches	B. Dixon, Co. Aud.
Minn.,	Crookston	10 a.m., Jan. 25.	Constructing drainage ditch, cost $6,000	H. J. Welte, Co. Auditor
Pa.,	Philadelphia	Jan. 29.	Constructing concrete dry dock at navy yard	Bureau of Yards and Docks, Navy Dept., Washington
South Africa,	Johannesburg	Feb. 15.	Machinery for utilizing by-products at municipal abattoirs	Municipal Council.

STREETS AND ROADS

Florence, Ala.—Paving of Court St. with vitrified brick on concrete considered by City Comrs. A. G. Wegley, City Clerk.

Helena, Ark.—Phillips County may build additional standard highway; a petition was presented to the Hon. Wm. B. Owen, State Highway Comnr., requesting that a survey be made of 147 miles of trunk roads running north and south through the county.

Los Angeles, Cal.—Report of Board of Public Works with reference to appropriation for construction of culverts on Sherman Way between A and B Sts., referred to finance committee.

Los Angeles, Cal.—Engineer instructed to proceed with the improvement of Hoover St. from Vernon Ave. to 52d St.

Los Angeles, Cal.—Engr. instructed to establish curb lines on Bethel St. between Marmion Way and Dayton Ave.

Los Angeles, Cal.—Committee representing the cities of Oceanside, El Cajon, La Mesa and East San Diego pre-

sented to the California Highway Commission a petition asking the Highway Commission to build the state highway through the four small cities.

Los Angeles, Cal.—Report of the City Engineer re the improvement of Normandie Ave. from Vernon Ave. to 54th St., referred to the Public Works Committee.

Los Angeles, Cal.—Engineer instructed to prepare ordinance for the improvement of Alexandria Ave. from Fountain Ave. to Santa Monica Blvd.

Oakland, Cal.—On the recommendation of Mayor John L. Davie the city council adopted a resolution overruling the numerous protests against the improvement of the West Oakland marsh lands, and ordered Commissioner of Streets W. J. Baccus to put through the streets in the district bounded by 15th, 32d, Union Sts. and the bay.

Oakland, Cal.—City Council decided to accept the offer of Henry Root for a free library site at East 15th St. and 24th Ave., and agreed in return to open and pave 24th Ave. from East 14th St. to the Foothill Blvd. at a cost of about $10,000.

Sacramento, Cal.—The approval of an appropriation for the construction of the scenic Alpine State Highway was urged before the State Budget Board by Assemblyman-elect C. P. Vicini of Jackson, Amador County.

Sacramento, Cal.—Resolution ordering improvement on Harkness Ave., grading, constructing concrete sidewalks, 5 ft. in width and 3½ ins. thick.

Sacramento, Cal.—Resolution for improvement of W. St.: grading, constructing concrete sidewalk 6 ft. in width, 3½ ins. in thickness, on official line; and grade.

San Jose, Cal.—Dept. of Public Works will outline paving program for five years.

Boulder, Colo.—City Council has adopted the Sioux City, Ia., specifications in preference to the standard specifications prepared by the American Concrete Institute for construction of 15 blocks of concrete paving next spring.

Jacksonville, Fla.—Baker county voted $90,000 bond issue to build a hard surface road across the county in connection with national highway. The strip will be 33 miles in length; $14,000 of federal aid money will be added.

Washington, D. C.—Washingon Gas Light Co. transfers to the United States certain of its property along the east bank of Rock Creek to permit of the opening through the valley of Rock Creek of the boulevard which is to connect Potomac Park with Zoological and Rock Creek parks. In return the company is given the use of land near the mouth of Rock Creek for wharf and freight purposes. Col. Harts also has arranged for the purchase, for about $20,000, of six parcels of privately owned land on the banks of Rock Creek within the area designed for improvement as a park avenue.

Bartow, Fla.—In the near future an election wil be held to issue $350,000 road and bridge bonds.

Pensacola, Fla.—The new board of commissioners stated their intention to repair roads in Escambia county.

St. Petersburg, Fla.—See "Sewerage."

Boise, Ida.—List of the roads on which the state highway commission wishes to spend the $1,500,000 it will ask from the legislature this winter. The national government has promised to appropriate $430,000 to be used in constructing the highways listed below, while the counties have told the commissioners that they would put up $1,888,000. Idaho-Pacific, $265,122; Yellowstone Park, $87,439; Sawtooth Park, $295,592; Idaho-Montana, $125,000; Idaho-Utah, $28,847; North and South, $353,000; Lewis and Clark, $80,000; North Pacific, $100,000; Panhandle, $165,000.

Danville, Ill.—The Illinois Highway Improvement Association, in session here, went on record in favor of a bond issue of $60,000,000 to construct 6,000 miles of road in the state, and the legislature will be asked to submit the proposition to the people of the state at the election in November, 1918.

East St. Louis, Ill.—Bids will soon be received by Council improving portion Missouri Ave.; about $60,000.

Joliet, Ill.—Ordinances for street improvements were approved as follows: Asphalt pavement on Wilcox St., cost of $40,436.51; asphalt and brick, Marion St., $30,150.54; sewer and water main on Taylor St. and Whitney Ave., the sewer $1,718.10 and water main, $2,930.37.

Joliet, Ill.—The unimproved portion of Hickory St., from Marble St. to the north city limits at Moran St., is to be improved with vitrified paving brick blocks. Will be laid with asphalt filled joints on sand cushion, resting on a concrete foundation. There are to be combined curbs and gutters, manholes, inlets and other improvements, cost approximately $24,000.

Minooka, Ill.—Highway Commissioners placed an order with the state highway commission for 2,000 yds. of crushed stone from the State Penitentiary, to be used in top dressing gravel roads; also voted to inspect the road west of the stone bridge near Knute Enger's, to consider widening the highway between the two bridges.

Peoria, Ill.—Road bond issue of $1,700,000 will be voted on in the near future.

Auburn, Ind.—De Kalb County, for gravel road; Franklin Twp., receiving bids in January. S. P. Nelson, Auburn, Aud.

Bicknell, Ind.—Noah Neal, of this city, bought $13,000 of gravel road bonds for a premium of $41 and accrued interest. The bonds are for ten years.

Cannelton, Ind.—Perry county bonds to the amount of $11,073.50 were awarded to the R. L. Dollings Co., of Indianapolis, for $397.50 premium and acrued interest.

Delphi, Ind.—Carroll county highway bonds to the amount of $4,500 were sold to the Fletcher American National Bank, Indianapolis, for $132 premium.

English, Ind.—The R. L. Dollings Co., of Indianapolis, was the successful bidder for a $3,300 issue Crawford county highway bonds, paying a premium of $119.46.

Fort Wayne, Ind.—City making plans for paving Greenlawn and Winter Sts. F. M. Randall, City Engr.

Fort Wayne, Ind.—The Hamilton National Bank bought road bonds amounting to $33,200 for a premium of $686.

Indianapolis, Ind.—Plans are under way for improving Illinois St. between 39th and 46th Sts., and it is expected the board will adopt a resolution for such an improvement early in the spring.

Richmond, Ind.—National road improvement in Center township known as the Dunbar Rd. Contracts will be let for this in January or February.

Shelbyville, Ind.—Scott A. Brown, county treasurer, sold an issue of 4½ per cent Shelby county road bonds, totaling $9,420, to the R. L. Dollings Co., of Indianapolis, for par, accrued interest and a premium of $347.50. Other bidders were: Breed, Elliott & Harrison and the Fletcher American Natl. Bank, of Indianapolis, and the Security Trust and Savings Co., of Shelbyville.

Vincennes, Ind.—Edward P. Blann, County Treasurer, sold $3,100 of gravel road bonds to Noah Neal, of Bicknell, at a premium of $41. Other bidders were the Fletcher American Natl. Bank and Breed, Elliott & Harrison, of Indianapolis, who bid $25.25 and $11, respectively. The bonds pay 4 per cent.

Wabash, Ind.—City making plans improving portion Huntington St. J. B. Chapler, city engr.

Marshalltown, Ia.—Board of Supvrs. promised trustees of Marietta Twp. that the County Engineer's office would be instructed to prepare profiles and estimates of the grading on the county's section of the Marietta Rd. at once, and that contract for the work would be let early enough so actual work could be commenced in the spring.

Parsons, Kan.—Eighteen blocks of paving were provided for in an ordinance passed by the city commission. Vitrified brick or concrete with an asphalt surface will be the paving material used. The approximate cost of the improvement will be $45,000.

Franklin, Ky.—An election will be held in the near future to vote on the question of issuing street improvement bonds for $20,000.

Hindman, Ky.—Knott county soon lets contract grading dirt roads, about $7,500. Address county clerk, Hindman.

Jenkins, Ky.—For about $40,000 city soon lets contract paving streets.

Lake Charles, La.—Street commissioners are ready to advertise for more street paving. Will add 13,000 sq. yds.

Towson, Md.—Baltimore County Commissioners plan improving portions Wiseburg and Joplin Rd. Address County Clk., Towson.

Boston, Mass.—Bd. of Street Comrs. will order improvements consisting of the laying out and construction of an extension of Stuart St., Boston proper, as a highway, from Trinity Pl. to Clarendon St., Jan. 11.

Attleboro, Mass.—Supt. H. J. Goodale of the Public Works Dept. recommends the use of the asphalt penetration method for constructing Union St. during the coming year. Cost is estimated at $16,312.75.

Haverhill, Mass.—City Engineer Lawton has notified the Bay State Street Railway Co. of the changes the city is to make in Hilldale Ave. and that it will be necessary for the company to relocate its tracks. One of the changes in the street will be the raising of the grade about 4 ft. The county commissioners have also been petitioned to improve that part of Hilldale Ave. which comes under their jurisdiction, and when the entire thoroughfare is completed it will make a main artery from Atkinson to this city. Alderman Wood says the street will be 60 ft. wide on the Haverhill end and 50 ft. wide on the Atkinson end.

Waltham, Mass.—Mayor Williams signed the order adopted by board of aldermen for the layout of West Dale, from Murray to Tomlin Sts. Before anything is done on the road a drainage service will be constructed. The order to provide for the drainage calls for appropriation of $3,350, while that for the street layout is for $5,775. The aggregate cost attending the entire work is $9,125.

Grand Rapids, Mich.—Grand Rapids Boulevard Association will meet to consider work for the coming year. The notable feature of the last season has been the completion of the boulevard around Reeds Lake. Further improvement of this boulevard will be on the program and in addition the completion of the down the river boulevard to Grandville probably will be taken up. It is likely also that a boulevard along the west and north edge of the town will be routed to start from John Ball Park, thence through some of the fruit growing districts to Greenwood Cemetery and Richmond Hills and northward to Comstock Park.

Zeeland, Mich.—For about $100,000, city making plans for paving. L. A. Bowlay & Co., Nicholas Bldg., Toledo, O., Engrs.

Mankato, Minn.—City will readvertise bids for graveling of Lewis St. and James Ave.

Marshall, Minn.—Main St. may be paved next year. A. A. Regnier, City Clk.

Minneapolis, Minn.—Council has authorized improvement of Bloomington Ave. between E. 40th and E. 42nd Sts. F. W. Cappelen, City Engr.

Laurel, Miss.—$10,000 paving bonds have been authorized. Address Mayor.

Butte, Mont.—City Council will be asked to readvertise for bids to be submitted under new specifications and opened in January for paving of South Montana St.

Helena, Mont.—City Comrs. have decided to pave Helena Av. next spring; 5,350 ft., 33 ft. wide, 6-in. cone.

Miles, Mont.—Custer County may improve highways, commissioners ascertaining the steps necessary to secure Federal funds.

Amityville, N. Y.—Ten towns in Suffolk county will have a total of $510,070.48 to spend for highway work during 1917, according to figures filed with board of supervisors.

Ballston Spa, N. Y.—Supervisor Namack's resolution to have the County Supt. of Highways John E. Hodgman prepare plans and estimates for the improvement of three miles of highway in the town was adopted. This is a portion of the road from High Mills to Middle Grove, connecting with the state road west of Ballston Spa and going south toward High Mills.

Brooklyn, N. Y.—Board of estimate passed a resolution appropriating $80,000 for paving the roadway of the Brooklyn Bridge with treated wood block.

Carthage, N. Y.—Supervisor George W. Hatch of the town of Wilna stated there was sufficient money to complete the Antwerp-Carthage state road and to build the Evans Mills-Watertown state road next season.

Celoron, N. Y.—Street improvement bonds carried for $2,500.

Geneva, N. Y.—An election favoring issuing water works bonds for $20,000.

Little Falls, N. Y.—Board of public works prepared a resolution to be submitted to the common council requesting that a sufficient sum be appropriated to

defray the expense of the survey of the following streets, which are to be paved: Diamond, Jackson, Lewis, Salisbury from Garden to Burwell St., and the contemplated paving of German St.

Niagara Falls, N. Y.—Sidewalks in 13th St., between Pine and Walnut Aves., were ordered put at grade at the owners' expense.

Niagara Falls, N. Y.—City Engineer Bennett estimates of $26,768 was confirmed; cost of paving Niagara St., between 22d and 24th Sts., at $8,040, and 24th St. from Buffalo Ave. to Cudaback Ave. to Niagara St.

Oswego, N. Y.—Resolution designating the following State highways for construction the coming year: Palermo-Mexico road, distance 5 miles; Minetto-Fulton road, Oswego, distance ¾ mile; Williamstown-Redfield road, 5 miles; Constantia-Cleveland road, 8 miles; Fulton-Baldwinsville road, part 2 in town of Granby, 2¾ miles. Adopted.

Riverhead, N. Y.—For highway work Suffolk County plans to spend $510,070 next year. Address County Clk., Riverhead.

Syracuse, N. Y.—Ordinances adopted for the resurfacing of the Wolf St. pavement from North Salina St. to 7th North St.

Syracuse, N. Y.—Ordinances adopted as follows: To pave Lilac St. from Pond St. to Mary St.; Melrose Ave. from Teall Ave. to Shotwell Park; directing the commissioner of public works to relay the sidewalk and grade the south side of East Fayette St. from Cherry St. to Maple St., not to cost more than $700.

Syracuse, N. Y.—If immediate steps are taken a boulevard without street car tracks can be constructed from Midland Ave. and Hovey St. south to Onondaga Valley, according to plans proposed by Glenn G. Holmes, chief engineer of the Syracuse Intercepting Sewer Board. Cost will be comparatively small if early decision is made. At present Hovey St. extends south from Midland Ave. along the west creek bank. The city has acquired some rights of way and with little addition of land of low value the street can be extended as a boulevard to South Ave. Condemnation proceedings are pending for right of way for a parkway from South Ave. south to Kirk Park. Plans and specifications for awarding a contract to extend the creek improvement and intercepting sewer from South Ave. to the south city line will be completed by Feb. 1, ready to advertise for bids. The board desires to have the improvements started in the early spring with a view of completing them within the year.

Watertown, N. Y.—The construction of over 110 miles of roads in this county was ordered by the board of supervisors. This will include the building of several new highways and also the extension of certain other roads, the mileage of all, however, totaling 110.25 miles.

Yonkers, N. Y.—The laying out and opening of Ashton Rd., from Hawthorne Ave. to the lands of the New York Central Railroad was approved.

Albemarle, N. C.—Paving one mile of streets considered by Town Comrs.

Franklin, N. C.—Jan. 15 Macon county, Cowee Twp., votes on bonds to grade and macadamizing roads. E. Johnson, Franklin, Clk.

Wilmington, N. C.—Paving of South Front St. from Castle to Dawson, a distance of two blocks, with vitrified brick, will begin as soon as material can be secured.

Canton, O.—Ordinance passed by council to improve portion 11th St. W. E. Sarver, city engr.

Canton, O.—State Highway Commissioner Cowan informed Stark county commissioners they would receive $15,121.58 in state aid for road work in 1917.

Frankfort, O.—For grading and paving, Ross County making plans to receive bids in January. W. Barrett, Chillicothe, County Aud.

Fremont O.—The county commissioners held a hearing in regard to various highways to be constructed in Sandusky county during 1917. In Sandusky township, beginning at the west corporation line of Fremont, ¾ mile of 16-ft. brick pavement will be laid on the Fremont-Bowling Green road at a cost of $18,000. On the Fremont-Castalia road, I. C. H. 281, one and three-tenths of a mile of 16-ft. brick pavement will be constructed to cost $26,000. It begins at the east line of Fremont. The Fremont-Bellevue road will probably receive one mile of pavement to cost $3,000. and the Maumee pike will be paved from Fremont to Muscalonge Creek at a cost of $30,000. The Sandusky-Clyde road will also receive attention, beginning at the Maumee pike in Clyde.

Johnstown, O.—Preliminary survey will be made by city to estimate cost paving portions East and West Coshocton Sts.

Lakewood, O.—Resolution passed by town improving and paving Thrush, Kyle and Northwood Sts. E. W. Fischer, City Engr.

Lancaster, O.—Bonds to improve West Fair Ave. and Columbus St. will be voted by city. J. Griggs, City Engr.

Lima, O.—Improving Ontario St. considered by city. B. H. Simpson, city engr.

Wapakoneta, O.—Paving portion St. Marys-Wapakoneta Pike considered by Auglaize County Comrs. Address Co. Clk, Wapakoneta.

Marshfield, Ore.—The Skyline Drive, between Marshfield and North Bend will cost $39,090 for grading alone according to estimate furnished a joint meeting recently by Engineer Lancaster.

Pittsburgh, Pa.—Citizens of Marshall, Pine, Ross, Franklin and McCandless Twps. request county comrs. to improve Perrysville Rd. from Keown station to the outskirts of Wexford, a distance of about 6 miles.

Philadelphia, Pa.—Following a recent announcement by Controller Walton that the city will sell $12,500,000 of city bonds early next year, he conferred with Mayor Smith and City Solicitor Connelly and the three officials fixed Jan. 8 for openings bids. It will be necessary for the city to borrow the amount to meet payments on contracts and parkway property. Another $12,500,000 issue will be sold next July, according to the present program.

Somerset, Pa.—Somerset Co. to improve road next summer. Viewers appointed by the court on petition of citizens of Upper Turkeyfoot Twp. have reported in favor of vacating part of a public road leading from the Mud Pike to Metzler's Bridge; Milford Twp. for a new road from the Cox's Creek Bridge to the intersection of the Mud Pike and the Marteeny Rd. A new road in Larimer Twp., leading from the Plank Rd. to Rody's Mill.

Newport, R. I.—Petition for a granolithic sidewalk on north side of Prospect Hill St.; granolithic sidewalks on Bellevue Ave.

Newport, R. I.—Resolution authorizing the board of aldermen to contract for paving gravel; also for crushed stone.

Newport, R. I.—Several streets and roads petition for action by city council Jan. 1.

Charleston, S. C.—From $30,000 to $40,000 will be presented to the city if the city will extend the present boulevard sea wall and drive so as to connect with East Battery, making, when completed, a continuous drive from the north end of East Battery along the water to the west end of Tradd St. This was referred to the ways and means committee and was given power to call for bids and specifications.

Greenville, S. C.—For paving and sidewalks, city to let contract in spring, about $130,000. W. T. B. Haynsworth, city engr.

Greenwood, S. C.—City plans to spend $7,500 for street paving. C. P. Ballenger, Engr.

Beaumont, Tex.—Streets to be paved and the cost are: Magnolia Ave. from Long to Wiess, $13,557.89; Park St. from Railroad Ave. to Washington Blvd., $4,467.26; Magnolia Ave. from Liberty to Laurel, $1,403.63; Laurel from Magnolia to Janes, $1,155.86; Neches St., $923.40; allowances to owners of triangular property, $1,121.47.

Dallas, Tex.—City plans opening part of Cabell St.

Dallas, Tex.—City Comn. granted petition of property owners on Davis St., from Beckley Ave. to Bishop St., asking for Uvalde rock asphalt paving.

Dallas, Tex.—Street Comr. Otto H. Lang recommended that Floyd St. between College and Oak be graded for sidewalks, at an approximate cost of $100.

Wichita Falls, Tex.—Active work for the calling of a $700,000 good roads bond issue for Wichita county will start immediately after the first of the year, according to C. W. Reid, chairman of the good roads campaign executive committee of the Wichita County Motor Club.

Clarendon, Va.—Road bonds issue of $300,000 considered by county commissioners.

Portsmouth, Va.—Hatton St. will be opened up from London to High St., making a direct thoroughfare from Park View to the business district.

Portsmouth, Va.—Matters that were held out of the budget and will be taken up with the city manager are an automobile for the chief of the fire department and the improving of a number of streets.

Portsmouth, Va.—A petition from the Tidewater Automobile Association asking that Water St. from Queen to London be paved with some smooth material was received and has been placed in the 1917 budget.

Richmond, Va.—City Engineer Bolling was instructed to advertise for bids for grading the alley extending from Granby to Meadow St., between Cary and Taylor.

Bluefield, W Va.—Seventy-three miles of new roads will be constructed next spring and summer in Wyoming county. County and Mercer County will be connected by a new road.

Fayetteville, W. Va.—Fayette County to build permanent road next year; 17 miles will be done between Fayetteville and Raleigh County line, along the old Giles, Fayette and Kanawha Turnpikes. Bids will be advertised. The improvement will be divided into three sections. One will extend from the Raleigh line to Glen Jean, another from Glen Jean to Oak Hill, and the other from Oak Hill to the county seat.

Olympia, Wash.—H. Hewes of Washington, D. C., district engineer with the federal department of agriculture, plans on road work with state highway board.

Palouse, Wash.—Main St. paving bonds, $22,441, has been authorized by city council.

Ritzville, Wash.—Comrs. have directed const. engr. to make surveys of the 5½ miles south of Ralston on the Washtucna Rd., and on road west of town as far as Grant county line.

Spokane, Wash.—Plans for a $15,000 fill on Washington St., between First and Second Aves., are being prepared by the City Engr. The plans contemplate leveling the street under the new Northern Pacific arch and cutting out the present dip. The roadway under the arch would be raised about 8 ft., giving a 20-ft. clearance.

Spokane, Wash.—Another attempt to make a permanent fill and roadway on East Olive Ave., between the two bridges and just north of the Inland tracks is under way according to reports reaching the public works dept. The Good Roads Association is understood to be interested in the scheme. The fill, which would considerably improve one of the main travel routes to the lakes, is estimated to cost about $30,000.

Tacoma, Wash.—County Comrs. are considering a permanent fill in place of a trestle from the end of 11th St. to the site of the Todd Shipbuilding & Drydock Co.; a 40-ft. strip has been donated if it is needed. This will give the county a roadway 140 ft. wide, which will give room on either side for sidewalks and prevent any congestion of traffic. The estimated cost of a trestle is $15,000, while a fill will cost $35,000 with about $7,000 for bulkheads.

Tacoma, Wash.—County commissioners are advertising for bids for widening and lengthening the Lincoln Ave. fill, which they expect eventually to turn into a paved highway. At present the county, in conjunction with the Hylobos diking district, is making a fill 40 ft. wide. It is planned to make this fill 28 ft. wider, which will eliminate the present trestle, and its costly upkeep. Bids are being asked also for the construction of a trestle on 11th St. to the site of the Todd Shipbuilding & Drydock Co., and also a permanent fill. The commissioners later will determine whether the highway will be built on a trestle or a fill.

Clarksburg, W. Va.—County court has been petitioned to call an election to issue road bonds, $250,000.

Cameron, W. Va.—City council considering issuing the following bonds: Paving, $25,000; sewerage, $25,000; water system improvement, $10,000.

Fairmont, W. Va.—In the near future an election will be held to issue road bonds, $330,000.

Balsom Lake, Wis.—An election will be held April 4 to issue $400,000 road bonds. County Clerk N. P. Swanson.

De Pere, Wis.—Front St. may be paved from Milwaukee Station to George St.

Madison, Wis.—The board of public works will hold a conference with Dudley Montgomery of the Madison Rail-

ways Co. to determine what kind of pavement shall be used by the company in paving its railway zone on Atwood Ave.

Stellarton, N. S.—Pavements and sidewalks, Town Council plans to construct; estimated cost, $50,960. Clerk, J. W. Henderson.

Toronto, Ont.—City Council decided to pave Davenport Rd. on a local improvement initiative plan at a cost of $144,000.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Los Angeles, Cal.—Board of public works: *C. A. Roberts—Ardmore Ave. from the southerly line of Fountain Ave. to the northerly line of Santa Monica Blvd., improved by grading and oiling, construction of cement curbs, cement sidewalks, concrete gutters; 1⅝ cts. per sq. ft. for cultivating, tamping and oiling, specifications No. 98; 1 ct. per sq. ft. for grading to finished surface, No. 98; 33 cts. per lin. ft. for cement curb, Class A, No. 88; 11 cts. per sq. ft. for cement sidewalk, No. 84; 14⅜ cts. per sq. ft. for concrete gutter, No. 91.

Los Angeles, Cal.—The board of public works, 57th St., Compton Ave., Fortuna St., improved by grading and oiling, the construction of concrete pavement, cement curbs, cement sidewalks, concrete gutters. *C. A. Roberts, 16 cts. per sq. ft. for concrete paving, including grading; 2⅛ cts. per sq. ft. for cultivating, tamping and oiling; 1 ct. per sq. ft. for grading to finished surface; 33 cts. per lin. ft. for cement curb, Class A; 11⅜ cts. per sq. ft. for cement sidewalk; 14⅜ cts. per sq. ft. for concrete gutter.

Los Angeles, Cal.—Board of public works, Arcadia St., from the northwesterly line of Los Angeles St. to the southeasterly line of North Main St., and portions of Sanchez St., construction of asphalt pavement, cement curb, cement sidewalk, granite block gutter, concrete garage, all other work or improvement. *Ford & Stout, 2 cts. per sq. ft. for grading to sub-grade, specifications No. 96; 17 cts. per sq. ft. for asphalt paving, No. 96; 35 cts. per lin. ft. for cement curb, Class A without armor band; 13 cts. per sq. ft. for cement sidewalk, No. 84; 40 cts. per sq. ft. for granite block gutter, No. 71; $27.25 for standard garage entrance, complete (Plan No. 27,696), Nos. 88 and 101; 35 cts. per lin. ft. for rebuilding granite curb, No. 111; 50 cts. per ln. ft. for cement curb, Class A, with armored band, No. 88.

San Francisco, Cal.—A strip of asphalt paving 30 ft. wide to run the entire length of the Embarcadero; announcement made by J. J. Dwyer, president of the Harbor Comn. Contract for the first piece of the work was let to the *Fay Improvement Co. for $15,424. This strip will extend from Pier 41 to Pier 29.

Visalia, Cal.—*Clark & Henry Construction Co., San Francisco, by city, improving portions East and School Sts.: 12.92 lin. ft. topeka asphalt on concrete base; 30c. lin. ft. concrete curb; 18c. lin. ft. gutter.

Amboy, Ill.—*Loepher & Son, Mendota, Ill.: Brick paving, 9,600 sq. yds.; macadam foundation, 6 in. thick, including earth and rock excavation, 3,500 cu. yds. Bidders: Rink & Schnece, Dixon, Ill.; Gund & Graham, Freeport, Ill.

Franklin Grove, Ill.—*Pronger & Fletcher, Blue Island, $8,170, secured contract by city for paving.

Mankato, Minn.—*L. J. Fox, from 52 to 64 cts. per sq. yd., graveling of Mulberry, Plum, Washington, Vine, Lime, Ann, May and Sixth Sts. Other bidders: John Page, from 75 cts. per yard to 90 cts.; T. R. Coughlan Co., from 70 cts. to $1.25 per yard; A. Bashaw, from 70 cts. to $1.20 per yard; H. D. King, from 80 cts. to $1.25; Laudin Bros., 75 cts. to $1; John McCall, from 75 cts. to $1.20.

Belgrade, Mont.—*Thos. Calk, $3,500, for riprapping Cameron bridge Rd.

Brooklyn, N. Y.—Street pavement with sheet asphalt, 13,880 sq. yds. including Portland cement concrete foundation 6 ins. thick, 2,500 cu. yds. earth excavation. Bidders: Boro Asphalt Co., Brooklyn, N. Y., $1.16 paving per sq. yd. (concrete $5.40 per cu. yd.), 80 cu. yds. excavation, total, $31,020.30; Cranford Co., Brooklyn, N. Y., $1.19 paving per cu. yd. (concrete at $5.50 per cu. yd.), 80 cu. yds. excavation, $31,691.45; Brooklyn Alcatraz Asp. Co., Brooklyn, N. Y., $1.15 paving per sq. yd. (concrete at $6 per cu. yd.), 80 cu. yds. excavation, $32,247.25. Pavement prices for wearing surface only. H. H. Schmidt, Chief Engr. Highways.

New Matamoras, O.—*Green & Getman, Woodsfield, O., $1.90 per sq. yd., street paving, brick, including of gravel foundation; excavation material, loam.

Brownwood, Tex.—*N. A. Dawson, San Antonio, Brown County, roads; about $100,000.

Seattle, Wash.—*McGuire Bros., 523 1st Ave. W., Seattle, at $9,975, for the construction of 1 mile of the Clarkston-Pomeroy division of the Silcott cut-off in Asotin county. Other bidders: H. C. Root, Spokane, $11,540; General Construction Co., Spokane, $10,950; Wm. Enoch, Lewiston, $10,974; Fred Sittkus and A. J. Swain, Asotin, $12,956. Estimate of County Engineer P. P. Ochler, $11,620.

Spokane, Wash.—*C. M. Payne for the construction of concrete curbing on Sharp Ave., from Monroe to Adams, by the City Council; $690. J. A. McNeil other bidder; $724.20.

SEWERAGE

Los Angeles, Cal.—Report of board of works for instructions to advertise for bids for creosoted piles for new outfall sewer pier at Hyperion. Referred to finance committee.

Waterbury, Conn.—See "Water Supply."

St. Petersburg, Fla.—City has called an election for Feb. 16 to vote on an issue of $180,000 of city bonds for waterfront improvement and providing a sewage disposal system. The items provided for in the bond issue are purchase of railroad lots held by individuals, along the right-of-way of the T. & G. C. Railroad, $12,000; Old Tomlinson pier improvements, $2,800; sewage disposal tanks, $30,000; purchase of waterlot 4, $20,000; purchase of Cook property on south side waterfront, $16,200; paving, $4,000; fill and seawall on south side, $90,000; improvements to city building, $5,000—total, $180,000. Provision is made in the bond issue for completion of Bayboro Harbor to comply with the requirements of the government.

Joliet, Ill.—See "Streets and Roads."

Marion, Ia.—Sanitary sewer for about $4,217 considered by city.

Fitchburg, Mass.—The engineer of the sewage disposal commission made a report favorable to a petition for a sewer in Connors St. and was accepted.

Sault Ste. Marie, Mich.—City engineer to prepare and submit plans for a trunk sewer system to take care of sewage and surface drainage for south side.

Minneapolis, Minn.—Bond issue for sewers urged by Lake Harriet Commercial Club in Linden Hills District.

Syracuse, N. Y.—See "Streets and Roads."

Watertown, N. Y.—Property owners in Newell, Howk and Lepper Sts. won a temporary victory before the common council when they succeeded in having the matter of a new sanitary sewer referred back to the board of public works.

Yonkers, N. Y.—The construction of a sewer in Iselin St., Silk Pl., Montague St. and Saw Mill River Rd. to the Nepperhan Valley sewer, was approved.

Barberton, O.—City plans disposal plant; about $100,000. H. W. Alcorn, City Engr.

Canton, O.—Ordinance passed by city council sanitary sewer portion Bedford Ave. N. W. W. E. Sarver, city engr.

Maumee, O.—City plans trunk sewers. G. Champs, Toledo, Consulting Engr.

New Philadelphia, O.—City Engineer Arnold presented plans to the city council for sewer in 10th, 12th and Maple St. and Boat-yard Alley, the first alley east of 3d St. Council took no action on the plans and estimates until it is determined whether or not sanitary sewer in other streets will be built.

Oberlin, O.—Council passed resolutions sewers in North Main and Union Sts.

Piqua, O.—City plans sewer portion Commerce St. A. Schroeder, City Engr.

Wilson, Okla.—$30,000 bond issue to install sewers; city will vote Jan. 5.

New Wilson, Okla.—Jan. 6, an election will be held on the question of issuing $40,000 sewer, light and water bonds. Address Town Clerk.

Portland, Ore.—Comr. Dieck of the Dept. of Pub. Wks. issued a statement to contractors who contemplate bidding for the contract for the reconstruction of the Tanner Creek sewer to the effect that he will issue monthly statements on the work, so as to aid the contractor who gets the conract to secure financial backing for the project. Complaint was made by several prospective bidders to the effect that they feared there would be a lack of approximate information as to the progress of the work, which would make it difficult for them to borrow money.

Elwood City, Pa.—Bids for sewer in Maple Way and Franklin Ave. soon received by city.

Erie, Pa.—Street Director W. D. Kinney's ordinance, passed, directs City Engr. Lynch to ask proposals on construction of a 9-in. sanitary tile sewer in 31st St. from Cascade St. east 560 ft. Estimated to cost $1,030.40.

Newport, R. I.—Resolution appropriating $2,000 for a sewer in Keeher St.

Newport, R. I.—Resolution appropriating $16,000 for the condemnation of lands and the installing of a sewerage system in the Almy Pond section.

Newport, R. I.—City council will act on petition for a sewer in Freeborn Rd. and in Blvd.

Dallas, Tex.—A small storm sewer will be installed at the intersection of Gaston Ave. and Moreland St., in addition to the sewer now under construction; will cost the city $329.50.

Gainesville, Tex.—For about $35,000 city made plans disposal plant. H. H. Maire, Austin, architect.

Honey Grove, Tex.—Improving sewer system contemplated by city.

Houston, Tex.—Immediate steps will be taken to secure for the city sanitary sewer mains that will be the basis of securing connections in all parts of the city. First to be undertaken is the South Side from Scott St. to the west side of the Turner addition. Bids will be advertised. Cost, approximately, $110,000.

Sulphur Springs, Tex.—Additional treatment to disposal plant considered by city. R. D. Saunders, City Engr.

Torney, Tex.—City made plans for disposal plant. Myers & Noyes, Dallas, architects.

Cameron, W. Va.—See "Streets and Roads.

Lindsay, Ont.—Installation of a sewage disposal plant contemplated by Town Council. Clerk, D. Ray.

St. Mary's, Ont.—A. B. Manson, city engineer of Stratford, has estimated the cost of the new sewer system and disposal plant for St. Mary's at $17,721. Thos. M. Clark, Town Clerk.

Vancouver, B. C.—Extension of the sewer on 25th Ave., between Glen Drive and Clark Drive, was authorized by City Council at an estimated cost of $2,050. City Engr., F. L. Fellowes.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Los Angeles, Cal.—To *Adam Balmatin, a vitrified pipe sanitary sewer, $150,000, 38th Pl., 56.63 ft. westerly from the center line of Wilton Pl. to a point 130.27 ft. westerly from the center line of Western Ave.

Boston, Mass.—Dec. 27, the Mayor approved a contract with *M. H. Loonie for sewerage work, $525, in Lawrence Ave., from existing sewer, about 65 ft. southeast of Mascoma St., about 95 ft. southeasterly; and in Stoughton St., from existing sewer, 347 ft. southeast of Columbia road, about 100 ft. southeasterly, Dorchester. Bids opened Dec. 15, as follows: Timothy Coughlin, $528.25; V. Grande, $594.25; John Guarino & Son, $640.25; George J. Rogan, $545.75.

Boston, Mass.—Mayor approved a contract with *Daddario & Booth for sewerage works, at $2,075, in Wilton St., Hyde Park, from Hyde Park Ave., about 250 ft. southeasterly, and in Randolph road, between Rock and Ridge roads, Dorchester. Bidders: James J. Conway, $2,137.50; A. Baruffaldi, $2,546.50; Frank Drinkwater, $2,605; Timothy Coughlan, $2,862; John Guarino & Son, $3,375; Geo. J. Regan, $3,687.50.

Boston, Mass.—Dec. 27 the Mayor approved a contract with *James J. Conway for sewerage works, $1,039.50, in Wilcox road, between Beaumont St. and Elm road, and in Sampson St., from Adams St., about 295 ft. easterly, Dorchester. Bids opened Dec. 15, were as follows: M. H. Loonie, $1,435.50; Timothy Coughlin, $1,438; Daddario & Booth, $1,475; D. Vozzella, $1,690.50; Frank Drinkwater, $1,721.25; John Guarino & Son, $1,753.75; A. Baruffaldi, $1,797.50; Geo. J. Regan, $1,848.75; V. Grande, $1,856.75.

Hamilton, O.—Frank J. Davis will probably be awarded the contract to construct the Pleasant Ave. storm sewer,

the tabulation of bids by City Engineer Frank Weaver being as follows: Frank J. Davis, $4,383.30; John L. Walker, $4,619.50; John H. Trunk & Son, $4,857.77; L. A. Dillon, $4,875.50. The estimate was $5,037.

Titusville, Pa.—For Monroe St. extension: *Chas. J. Ward, 32 Bloss St.; $340.04.

Erie, Pa.—For a $23,000 sewer system, by Council: On a bid of $19,461, *L. V. Metz and *Jacob Roth, a storm water sewer system to drain the Parade and Division St. subways and for $2,642.50 they will reconstruct the sanitary sewer in Parade St. from 15th to 16th Sts.

Richmond, Va.—Administrative board awarded contract to *Burton Maryo for a sewer in Bowe St., between Clay and the alley to the south at $550.55.

Richmond, Va.—By administrative board to *Cosby & Maynard, for construction of a sewer in the alleys between Northside Ave. and Gladstone Ave., from Meadowbridge road to Napoleon St., at $1,064.80.

Tacoma, Wash.—*John Payne, at $1,450, for the installation of a tile sewer in the alley between E and Tacoma Aves., from 45th to 48th Sts. Other bidders: Pacific Sewer & Watermain Construction Co., $1,465; Galluci & Son (cement pipe), $1,473. Engineer's estimate, $1,632.50.

London, Ont.—*Goodwin, McCallum & Judge, 643 William St., for construction of a 10-in. sanitary sewer on Bathurst St.; cost, $16,000; let by City Council.

Mimico, Ont.—To supply and install centrifugal sewage pumps amounting to $6,000: The *Turbine Equipment Co., Ltd., Toronto, secured contract.

New Toronto, Ont.—For centrifugal sewage pumps for the town of New Toronto amounting to $4,250. Two of these will be driven by vertical motors, and the high-speed gasoline engine: The *Turbine Equipment Co., Ltd.

Sandwick, Ont.—The town council for the construction of a water main and sewer on Centre St., to *Merlo. Merlo & Ray, at $43,579.

WATER SUPPLY.

Redding, Cal.—City takes first step toward municipal owned water system. Formal application made by City Attorney Tillotson to State Water Commission to file on Water in Brandy Creek, near Whiskytown, for municipal purposes.

Waterbury, Conn.—City Engineer Cains and city water committee were appointed a committee to determine the amount of a bond issue to be recommended for raising funds for construction of a third reservoir on the branch system. The city engineer stated in response to a question by the mayor that $500,000 would be needed to carry on the work for the next few years and said that this would be only a part of the full amount needed to build the reservoir. The committee in charge was also instructed to report an estimate on the size of a bond issue required to construct a trunk sewer from Waterville to the Washington Ave. bridge over the Naugatuck River.

Savannah, Ga.—Council plans 14,000 water meters. E. R. Conant, engr.

Blackfoot, Ida.—Council plans to purchase and improve system Blackfoot Water Co.

Joliet, Ill.—See "Streets & Roads."

Havlock, Ia.—The proposition to issue water bonds will be submitted to vote Jan. 6.

Pella, Ia.—City has been granted the privilege to extend and lay gallery for water supply along public highway. H. F. Johnson, Mayor.

Waterloo, Ia.—John P. Berry, supt. of Waterworks, plans to lay a 16-in. water main across the river at Sans Souci while the ice is in.

Lawrence, Kan.—Black & Veatch, the consulting engineers for the rehabilitation of the Lawrence water plant, have plans nearly completed for the new pump house, site for which is to be formally announced by the citizens advisory water committee soon. The plans also contain drawings and specifications for the equipment of the new plant.

Auburn, Ky.—Bond issue for water system considered by town board trustees.

Alma, Mich.—A bond issue of $60,000 for construction of water works carried.

Sault Ste. Marie, Mich.—A new 6-in. cast-iron water main will replace the old calamine main on Dawson St., between Bingham and Kimball. The board of public works was instructed to look after the work.

West Concord, Minn.—A bond issue of $8,500 for water works carried at election. R. C. Jones, Village Clerk.

Ozark, Mo.—Water works in Ozark considered by Christian County. J. C. Rogers, Ozark, interested.

Dansville, N. Y.—With the organization of the Carso Paper Co. it will be necessary for the town to secure an additional water supply. Engr. Hopkins of Rochester, is now engaged in making plans. It is expected that plans and specifications for the extension will be submitted to the consideration of the taxpayers at the village election to be held in February.

Belmont, N. C.—City plans water works and sewer systems. Address mayor.

Wilmington, N. C.—The finance committee will look into the recommendation of Engineer Sweeney of the water works department that the city buy a machine for facing valves. Cost, $276.

Bellaire, O.—Water main in Union St. considered by Council. About $16,000. J. Wilkinson, Supt.

Kent, O.—City plans $110,000 bond issue installing filters, pumps, boiler and additional piping. S. F. Messer, Supt.

Martin's Ferry, O.—City making plans addition and extending water system. About $10,000.

Verdee, Okla.—City considers water system. J. W. Kern, mayor.

Wilson, Okla.—See "Sewerage."

Monaco, Pa.—City Council on recommendation of Engineer Michael Baker

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Stuart, Iowa.—Following bids received Dec. 7 for constructing collection and outfall sewer. (T. S. Delay, engineer, Creston.)

Items—	Dunnegan & Briggs, Shenandoah, Ia. Clay.	D. F. Paterson Des Moines, Ia. Clay.	Empire Con. Co., Des Moines, Ia. Clay.	Empire Con. Co., Des Moines, Ia. Conc.	J. L. Hansman, Des Moines, Ia. Clay.	C. Mancini, Florence, Neb. Clay.	C. Mancini, Florence, Neb. Conc.
15-in. pipe	$ 0.55	$ 0.48	$ 0.57	$0.57	$ 0.60	$ 0.61	$ 0.61
800 ft.	440.00	384.00	456.00		480.00	488.00	488.00
12-in. pipe	.40	.37	.41	.41	.51	.47½	.47½
5,971 ft.	2,388.40	2,209.27	2,448.11		3,045.26	2,836.23	2,836.23
Ext. for D. S. 12-in.	.06	.05	.07	.07	.05	.05	.05
3,840 ft.	230.40	192.00	268.80		192.00	192.00	192.00
Ext. for 12-in. x 6-in. Spt.	.60	.90	.61	.61	1.00	.95	.95
113	67.80	101.70	68.93		113.00	107.35	107.35
10-in. pipe	.30	.25	.34	.34	.45	.36	.36
8,126 ft.	2,437.80	2,031.50	2,842.84		3,656.70	2,925.36	2,925.36
Ext. for 10-in. x 6-in. Spt.	.55	.50	.48	.48	.90	.70	.70
80	44.00	40.00	38.40		72.00	56.00	56.00
8-in. pipe	.25	.40	.24	.24	.34	.27½	.22½
26,538 ft.	6,634.50	10,615.20	6,369.12		9,022.92	7,297.95	5,471.05
Ext. for 8-in. x 6-in. Spt.	.50	.30	.35	.35	.70	.50	.50
742	371.00	222.60	259.70		519.40	371.00	371.00
Totals for pipe in place	$12,613.90	$15,796.27	$12,751.90		$17,101.23	$14,273.89	$12,946.99
Manholes without tops	3.00	3.25	3.35		3.00	3.10	
1,122 ft.	3,366.00	3,646.50	3,758.70		3,366.00	3,478.20	
Trenching and Backfilling.							
4-ft. to 6-ft. cut	.15	.16	.18		.25	.12	
3,021 ft.	453.15	483.36	543.78		755.25	362.52	
6-ft. to 8-ft. cut	.20	.18	.31		.25	.12	
2,200 ft.	440.00	396.00	682.00		550.00	264.00	
8-ft. to 10-ft. cut	.30	.20	.36		.25	.18½	
15,126 ft.	4,537.80	3,025.20	5,445.36		3,781.50	2,798.31	
10-ft. to 12-ft. cut	.30	.28	.44		.35	.32	
11,962 ft.	3,588.60	3,349.36	5,263.28		4,186.70	3,827.84	
12-ft. to 14-ft. cut	.40	.46	.69		.45	.48½	
4,901 ft.	1,960.40	2,254.46	3,381.69		2,205.45	2,376.99	
14-ft. to 16-ft. cut	.55	.76	.82		.70	.75	
380 ft.	209.00	288.80	311.66		266.00	285.00	
16-ft. to 18-ft. cut	.65	1.25	1.45		1.00	1.08	
ft.							
18-ft. to 20-ft. cut	.75	1.50	1.65		1.00	1.32	
1,725 ft.	1,293.75	2,587.50	2,846.25		1,725.00	2,277.00	
20-ft. to 22-ft. cut	2.10	1.75	2.50		1.00	1.58	
1,700 ft.	3,570.00	2,975.00	4,250.00		1,700.00	2,686.00	
22-ft. to 24-ft. cut	2.40	2.00	3.25		1.25	2.00	
ft.							
24-ft. to 26-ft. cut	2.65	2.00	3.50		1.40	2.20	
ft.							
26-ft. to 28-ft. cut	3.00	3.00	3.60		1.60	2.70	
420 ft.	1,260.00	1,260.00	1,512.00		672.00	1,134.00	
28-ft. to 30-ft. cut	3.50	3.25	4.00		1.70	3.50	
ft.							
Totals for trenching and backfilling	$17,312.70	$16,619.68	$24,236.02		$15,841.90	$16,011.66	
Grand Totals	$33,292.60	$36,062.45	$40,746.62		$36,309.13	$32,436.85 com. $33,763.75 vitrified	

Contract awarded to Dunnegan & Briggs.

Allentown, Pa.—The following bids were received December 26, for the construction of a storm sewer. C. D. Weirbach, city engineer:

	SECTION I. Tilghman St., 18th to 19th and 19th St., Tilghman to Congress.	George H. Hardner, Allentown, Pa.		Whiting-Turner Con. Co. Baltimore, Md.		R. J. Rathburn, Allentown, Pa.		McInerney & McNeal, Easton, Pa.	
		Unit	Total	Unit	Total	Unit	Total	Unit	Total
	100 lin. ft., special timber box cul. sec.	$ 4.50	$ 450.00	$ 9.80	$ 980.00	$ 5.60	$ 560.00	$ 3.84	$ 384.00
a	623 lin. ft., 48" cir. mono. con. sewer	4.55	2,834.65	8.45	5,264.35	....	.....	....	.....
b	Reinforced concrete pipe sewer	....	.....	8.45	5,264.45	1 @ 7.75	4,828.25	1 @ 8.08	5,033.84
c	Segmental block sewer	....	.....	8.45	5,264.45	....	.....	....	.....
a	1,860 lin. ft., 42" cir. mono. con. sewer	5.00	9,300.00	9.00	16,740.00	....	.....	....	.....
b	Reinforced concrete pipe sewer	....	.....	9.00	16,740.00	1 @ 7.42	13,801.20	1 @ 7.26	13,503.60
c	Segmental block sewer	....	.....	9.00	16,740.00	....	.....	....	.....
a	300 lin. ft., 36" cir. mono. con. sewer	3.76	1,128.00	5.74	1,722.00	....	.....	....	.....
b	Reinforced concrete pipe sewer	....	.....	5.74	1,722.00	1 @ 5.95	1,785.00	1 @ 5.51	1,653.00
c	Segmental block sewer	....	.....	5.74	1,722.00	....	.....	....	.....
	620 lin. ft., 24" D.S. vitrified pipe sewer	2.80	1,736.00	4.57	2,833.40	3.20	1,984.00	3.29	2,032.80
	Lock joint concrete pipe	....	.....	....	.....	....	.....	3.14	.....
	13" Circular standard brick manholes	58.00	754.00	75.00	975.00	65.00	845.00	85.00	1,105.00
	4-30" "A" Inlets	102.00	408.00	80.00	320.00	92.00	368.00	140.00	560.00
	3-36" "A" Inlets	126.00	378.00	81.00	243.00	96.00	288.00	145.00	435.00
	5-30" "C" Inlets	108.00	540.00	75.00	375.00	88.00	440.00	140.00	700.00
	1-36" "C" Inlet	102.00	102.00	76.00	76.00	92.00	92.00	145.00	145.00
	18-30" "E" Inlets	110.00	1,980.00	78.00	1,404.00	86.00	1,548.00	140.00	2,520.00
	2-36" "E" Inlets	112.00	224.00	79.00	158.00	90.00	180.00	145.00	290.00
	1,100 cu. yds. Rock excavation	1.50	1,650.00	2.00	2,200.00	2.25	2,475.00	2.50	2,750.00
	Extra earth excavation	.75	.....	.75	.....	.75	.....	.75	.....
	Extra 1:2:4 con. in place (incl. forms)	10.00	.....	10.00	.....	7.00	.....	10.00	.....
	200 lin. ft., 15" vitrified pipe sewer	1.57	314.00	1.90	380.00	2.25	450.00	1.76	352.00
	1-Cir. standard brick manhole	58.00	58.00	75.00	75.00	65.00	65.00	85.00	85.00
	1-30" "A" Inlets	108.00	108.00	80.00	80.00	92.00	92.00	140.00	140.00
	2-30" "E" Inlets	96.00	192.00	78.00	156.00	86.00	172.00	140.00	280.00
	1-36" "D" Inlets	100.00	100.00	71.00	71.00	95.00	95.00	145.00	145.00
	Total a	....	22,256.65*	....	34,052.75	....	.....	....	.....
	Total b	....	.....	....	34,052.75	....	30,068.45	....	32,121.24
	Total c	....	.....	....	34,052.75	....	.....	....	.....

	SECTION 2. Lehigh St., So. 6th to So. 9th Sts.	McInerney & McNeal, Easton, Pa.		Jas. Ferry & Sons, Inc. Atl'tic City, N. J.		Schaeffer & Ackerman, Allentown, Pa.	
		Unit.	Total.	Unit.	Total.	Unit.	Total.
31	635 lin. ft. 22" vitrified pipe sewer	$3.17	$2,012.95	$2.95	$1,873.25	$2.85	$1,809.75
32	330 lin. ft. 18" vitrified pipe sewer	2.59	854.70	2.45	808.50	2.28	752.40
33	530 lin. ft. 15" vitrified pipe sewer	1.91	1,012.30	1.95	1,033.50	2.00	1,060.00
34	8 circular standard brick manholes	75.00	600.00	65.00	520.00	70.00	560.00
35	2 36" "B" inlets	125.00	250.00	85.00	170.00	85.00	170.00
36	2 36" "E" inlets	125.00	250.00	90.00	180.00	90.00	180.00
37	9 30" "E" inlets	120.00	1,080.00	90.00	810.00	88.00	792.00
38	200 cu. yds. rock excavation	2.50	500.00	2.25	450.00	2.50	500.00
39	10 cu. yds. 1:4:8 concrete	7.00	70.00	9.00	90.00	6.00	60.00
40	Extra earth excavation	.75	.....	.75	.....	.75	.....
41	Total	.....	$6,629.95	.....	$5,935.25	.....	$5,884.15

	SECTION 3. Sumner Ave., 12th to 14th St.	Geo. H. Hardner,* Allentown, Pa.		Whiting-Turner, Con. Co., Baltimore, Md.		McInerney & McNeal, Easton, Pa.	
		Unit.	Total.	Unit.	Total.	Unit.	Total.
42	1,300 lin. ft. 7'-3"x8'-4" rein. con. box cul. sewer	$15.48	$20,124.00	$25.70	$33,410.00	$24.56	$31,928.00
43	2 circular con. manholes	35.00	70.00	50.00	100.00	40.00	80.00
44	2 plan "G" inlets	50.00	100.00	80.00	160.00	250.00	500.00
45	1 special inlet	50.00	50.00	85.00	85.00	50.00	50.00
46	2,500 cu. yds. rock excavation ($1.40)	1.90	4,750.00	2.00	5,000.00	2.50	6,250.00
47	Extra earth excavation	.75	.....	.75	.....	.75	.....
48	Total	.....	$25,094.00*	.....	$38,755.00	.....	$38,808.00

	SECTION 4. East Maple and East Clair Sts., South Bradford to No. Ellsworth.	Whiting-Turner Const. Co. Baltimore, Md.		McInerney & McNeal, Easton, Pa.		James Ferry & Sons, Inc., Atlantic City, N. J.		Weaver Contracting Co.,* Allentown, Pa.		Frank Cannon, Allentown, Pa.	
		Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.
49 A	2,570 lin. ft. 48" cir. mon. con. sewer.	$9.70	$24,929.00	...	.....	$8.40	$21,588.00	$7.25	$18,632.50	$9.32	$23,952.40
50	600 lin. ft. brick invert in above (optional with city)	1.13	678.00	...	.....	.75	450.00	.50	300.00	1.00	600.00
51 B	2,570 lin. ft. 48" cir. rein. con. p. sewer	9.70	24,929.00	l.j. $8.84	$22,718.80	c.j. 8.40 l.j.	21,588.00	l.j. 8.00 p.u.	20,560.00	l.j. 9.20	23,644.00
52 C	Seg. block sewer	9.70	24,929.00	...	.....	A. 8.40	21,588.00	p.s. 7.25	18,632.50	...	.....
53	86 lin. ft. os. vit. pipe sewer, 24"	2.00	172.00	3.29	282.94	3.50	301.00	3.00	258.00	5.00	430.00
54	10 cir. standard brick manholes	75.00	750.00	85.00	850.00	65.00	650.00	50.00	500.00	65.00	650.00
55	1 36" "B" inlet	85.00	85.00	120.00	120.00	85.00	85.00	95.00	95.00	80.00	80.00
56	1 30" "C" inlet	75.00	75.00	115.00	115.00	80.00	80.00	90.00	90.00	80.00	80.00
57	1 36" "C" inlet	76.00	76.00	120.00	120.00	90.00	90.00	95.00	95.00	80.00	80.00
58	4 30" "D" inlets	70.00	280.00	115.00	460.00	85.00	340.00	90.00	360.00	80.00	320.00
59	2 36" "D" inlets	71.00	142.00	120.00	240.00	90.00	180.00	95.00	190.00	80.00	160.00
60	8 30" "E" inlets	78.00	624.00	115.00	920.00	90.00	720.00	90.00	720.00	75.00	600.00
61	3 36" "E" inlets	79.00	237.00	120.00	360.00	100.00	300.00	95.00	285.00	75.00	225.00
62	475 lin. ft. 6x8" standard con. curbing	.70	332.50	.60	285.00	.70	332.50	.55	261.25	.90	427.50
63	925 lin. ft. 24x8" standard con. gutter	.50	462.50	.60	555.00	.80	740.00	.46	425.50	.50	462.50
64	650 cu. yds. rock excavation	2.00	1,300.00	2.50	1,625.00	2.00	1,300.00	2.50	1,625.00	3.00	1,950.00
65	Extra earth excavation	.75	.....	.75	.....	.75	.....	.75	.....	.75	.....
	con. in place (including forms)	10.00	.....	10.00	.....	9.00	.....	6.50	.....	9.00	.....
67	Total A	...	29,465.00	...	.....	...	26,706.50	...	23,537.25	...	29,417.40
68	Total A with brick invert	...	30,143.00	...	.....	...	27,156.50	...	23,837.25*	...	30,017.40
69	Total B	...	29,465.00	...	28,651.74	...	26,706.50	...	25,464.75	...	29,109.00
70	Total C	...	29,465.00	...	.....	...	26,706.50	...	23,537.25	...	.....

*Awarded contract on Monolithic Concrete sewer.

SECTION I. Tilghman St., 18th to 19th and 19th St., Tilghman to Congress.		James Ferry & Sons, Inc. Atlantic City, N. J. Unit	Total	Weaver Contracting, Co. Allentown, Pa. Unit	Total	Frank Cannon, Allentown, Pa. Unit	Total	Fred T. Buckius, Jr. Philadelphia, Pa. Unit	Total
100 lin. ft., special timber box cul. sec.		$ 4.00	$ 400.00	$ 4.50	$ 450.00	$ 7.50	$ 750.00	$ 5.00	$ 500.00
a 623 lin. ft., 48" cir. mono. con. sewer		6.50	4,049.50	6.75	4,205.25	8.20	5,108.60	8.25	5,139.75
b Reinforced concrete pipe sewer	c s			l s					
	l s	6.50	4,049.50	pu 7.25	4,516.75	l s 8.17	5,089.91	l s 7.00	4,361.00
c Segmental block sewer	a	6.50	4,049.50	p s 6.45	4,018.35	....	.....	a 9.25	5,762.75
a 1,860 lin. ft., 42" cir. mono. con. sewer		6.00	11,160.00	6.00	11,160.00	8.10	15,066.00	9.50	17,670.00
b Reinforced concrete pipe sewer	c s			l s					
	l s	6.00	11,160.00	pu 6.50	12,090.00	l s 8.00	14,880.00	l s 8.50	15,810.00
c Segmental block sewer	a	6.00	11,160.00	p s 5.85	10,881.00	....	.....	a 10.00	18,600.00
a 300 lin. ft., 36" cir. mono. con. sewer		5.25	1,575.00	5.65	1,695.00	5.80	1,740.00	7.00	2,100.00
	c s			l s					
b Reinforced concrete pipe sewer	l s	5.25	1,575.00	pu 5.90	1,770.00	l s 6.25	1,875.00	l s 6.00	1,800.00
c Segmental block sewer	a	5.25	1,575.00	p s 5.30	1,590.00	....	.....	a 7.50	2,250.00
620 lin. ft., 24" D.S. vitrified pipe sewer		3.25	2,015.00	2.65	1,643.00	4.60	2,852.00	4.50	2,790.00
Lock joint concrete pipe		....	.....	....	.....	....	.....	3.75	.....
13" Circular standard brick manholes		65.00	845.00	52.50	682.50	65.00	845.00	60.00	780.00
4-30" "A" Inlets		80.00	320.00	90.00	360.00	80.00	320.00	160.00	640.00
3-36" "A" Inlets		90.00	270.00	95.00	285.00	80.00	240.00	160.00	480.00
5-30" "C" Inlets		80.00	400.00	90.00	450.00	80.00	400.00	160.00	800.00
1-36" "C" Inlet		90.00	90.00	95.00	95.00	80.00	80.00	160.00	160.00
18-30" "E" Inlets		90.00	1,620.00	90.00	1,620.00	75.00	1,350.00	160.00	2,880.00
2-36" "E" Inlets		100.00	200.00	95.00	190.00	75.00	150.00	160.00	320.00
1,100 cu. yds. Rock excavation		2.00	2,200.00	2.50	2,750.00	3.00	3,300.00	3.00	3,300.00
Extra earth excavation		.75	.....	.75	.....	.75	.....	.75	.....
Extra 1:2:4 con. in place (incl. forms)		9.00	.....	7.50	.....	9.00	.....	11.25	.....
200 lin. ft., 15" vitrified pipe sewer		1.80	360.00	2.30	460.00	1.65	330.00	1.50	300.00
1-Cir. standard brick manhole		65.00	65.00	52.50	52.50	65.00	65.00	70.00	70.00
1-30" "A" Inlets		80.00	80.00	90.00	90.00	80.00	80.00	180.00	180.00
2-30" "E" Inlets		90.00	180.00	90.00	180.00	75.00	150.00	170.00	340.00
1-36" "D" Inlets		90.00	90.00	90.00	90.00	80.00	80.00	140.00	140.00
Total a		....	25,919.50	....	26,458.25	....	32,906.60	....	38,589.75
Total b		....	25,919.50	....	27,774.75	....	32,836.91	....	35,651.00
Total c		....	25,919.50	....	25,887.35	....	.....	....	40,292.75

	Continental Contr. Co., Inc. Baltimore, Md. Unit.	Total.	Weaver Con tr. Co., Allentown, Pa. Unit.	Total.	Fred. T. Buckins, Jr., Philadelphia, Pa. Unit.	Total.	
	$2.65	$1,682.75	$2.90	$1,841.50	$4.50	$2,857.50	31
	2.30	759.00	2.57	848.10	3.00	990.00	32
	1.95	1,033.50	2.00	1,060.00	2.50	1,325.00	33
	50.00	400.00	52.50	420.00	70.00	560.00	34
	70.00	140.00	90.00	180.00	135.00	270.00	35
	70.00	140.00	95.00	190.00	135.00	270.00	36
	70.00	630.00	90.00	810.00	135.00	1,215.00	37
	2.50	500.00	2.00	400.00	3.00	600.00	38
	7.00	70.00	6.00	60.00	7.00	70.00	39
	.75	.....	.75	.....	.75	.....	40
	.....	$5,355.25*	.....	$5,809.60	.....	$8,157.50	41

	Jas. Ferry & Sons, Inc. Atl'tic City, N. J. Unit.	Total.	Weaver Contracting Co., Allentown, Pa. Unit.	Total.	H. Denberger Contracting Co., Bethlehem, Pa. Unit.	Total.	
	$21.50	$27,950.00	$14.95	$19,435.00	$15.89	$20,657.00	42
	65.00	130.00	50.00	100.00	15.00	30.00	43
	80.00	160.00	90.00	180.00	15.00	30.00	44
	100.00	100.00	90.00	90.00	35.00	35.00	45
	1.75	4,375.00	2.25	5,625.00	2.50	6,250.00	46
	.75	.....	.75	.....	.75	.....	47
	.....	$32,715.00	.....	$25,430.00	.....	$27,002.00	48

decided on electric driven pump for the water works. Engineer was instructed to secure complete details concerning the pumps, and report to the council.

Liberty, S. C.—City plans election to vote on bonds to build water system.

Brownsville, Tex.—F. H. Williams, city manager of the city of Brownsville, wishes to receive pump bulletins from centrifugal pump manufacturers, showing characteristic curves and other data necessary.

Camerson, W. Va.—See "Strects and Roads."

Morton, Wash.—Council voted to install a gravity water plant.

Ritzville, Wash.—System of Washington Water Power Co. is to be rebuilt immediately. Work includes new pole lines, transformers and lighting system.

Seattle, Wash.—Advertisement of sale of several tons of steel bonds for wooden pipe in the water department yards will be published.

Port Moody, B. C.—The city has applied to the Provincial Government for authority to store water from Noon Creek to be used for municipal purposes.

Winnipeg, Can.—City Council will purchase about 1,200 ft. of 8-in. c. i. pipe, three hydrants and three valves. In conection with the proposed water main on Academy Rd.

Trail, B. C.—The Coast Copper Co., Ltd., has applied to the Provincial Government for authority to use water out of Canyon Creek for power and mining purposes.

Cayuga, Ont.—Installation of an elevated tank and hydrants for fire protection contemplated by Town Council. Clk., J. W. Sheppard.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Waterbury, Conn.—Board of Public Works for the construction of the division tunnel on the west branch of the water system to *Gray & Ireland, $41,-149.87. Other bidder, Barbara & D'Auria. Estimate was $50,871.50.

Ossian, Ia.—Town Council: The *Des Moines Bridge and Iron Co., to extend Ossian's water works system.

Winnipeg, Man.—*Canada Cement Co. at $2.61 per barrel; Greater Winnipeg Water District Comrs. let contract for 150,000 barrels Portland cement in connection with water system.

Atlantic City, N. J.—For a centrifugal pump for the water department, to be installed at the pumping station. The pump is to have a capacity of 2,500 gals. an hour. The following bids were received: Morris Machine Co., of New York, $695; National Machine Works, Atlantic City, $736; Wm. M. Jackson, $1,047; D'Olier Pump and Machine Co., $750; Eagle Gear and Machine Co., $435; were referred to Director Thompson and Supt. VanGuilder, of the Water Dept.

Tulsa, Okla.—City new rapid filtration and water softening plant, for which $180,000 in bonds were voted recently; will be erected by the *Fogel Constr. Co. of Kansas City at a contract cost of $174,050.

Sandwich, Ont.—See "Sewerage."

MISCELLANEOUS.

Fresno, Cal.—A committee of 30 Kings River irrigationists approved the plans of Louis C. Hill, United States Consulting Engineer, for a conservation dam at Pine Flat, Fresno County. The estimated cost of the dam is $9,000,000. The irrigationists are discussing ways and means for raising money, either by bonding the irrigation district or by direct assessment on the lands adjacent to Kings River.

Los Angeles, Cal.—Resoluton adopted authorizing the board of public works to advertise for bids and award contract for furnishing of grade stakes and fire escapes on the police station.

Los Angeles, Cal.—The report of the board of public works in re instructions to advertise for bids for construction of a vault in city hall tower and also asking for an appropriation of $15,000 additional for oil for street improvement, also an appropriation of $9,000 for the purpose of installing additional lights in engineering department. Referred to finance committee.

Los Angeles, Cal.—Purchasing Agent instructed to advertise for bids for the sale of steel and cast iron at old city incinerator.

Oak Park, Cal.—Petition from Maple Park and vicinity asking an auto police patrol service.

Red Bluff, Cal.—Red Bluff business men began plans for a campaign for a $150,000 bond issue for the construction of a new Court House for Tehama Co.

Woodland, Cal.—Woodland, Yolo Co., club members inaugurated a campaign for a bond issue to purchase four public park sites in that city.

Washington, D. C.—Bureau of Foreign and Domestic Commerce (Dept. of Commerce).—A man in Switzerland desires to purchase several 1 to 2-ton motor trucks. Cash will be paid against documents. Correspondence should be in French or German. Quotations should be made c. i. f. European port. Reference. Refer to Opportunity No. 23383.

Washington, D. C. Bureau of Foreign and Domestic Commerce (Department of Commerce).—A company in Norway desires to purchase shipbuilding materials, such as plates, angles, tees, boiler materials, anchors, chains, wire; also brass and copper tubes. Quotations should be made c. i. f. destination. Correspondence in English. Reference. Refer to Opportunity No. 23359.

Washington, D. C.—Bureau of Foreign and Domestic Commerce (Department of Commerce).—A firm in Switzerland is in the market for sulphate of copper, to be used in treating wood. Quotations should be made c. i. f. European port. Cash will be paid against documents. Correspondence in French or German. References. Refer to Opportunity No. 23348.

Washington, D. C.—Bureau of Foreign and Domestic Commerce (Department of Commerce).—A company in Switzerland is in the market for from 5,000 to 10,000 key lamp sprockets having a removable porcelain ring as insulator instead of the usual brass ring with insulated mat. The purchaser will take the brass sprockets without the porcelain ring insulators if impossible to supply the latter. A sample of the sprocket desired may be examined at the Bureau or its District Offices. Refer to file No. 82529. Quotations should be made f. o. b. New York. Cash will be paid against documents. Correspondence in English. Reference. Refer to Opportunity No. 23341.

Washington, D. C.—Bureau of Foreign and Domestic Commerce (Dept. of Commerce).—Supplementing foreign trade opportunity No. 23309, a firm in Brazil, with a branch office in New York, informs the Bureau that it desires to represent American manufacturers of road-making machinery, tractors, cement, rosin, paints, oils, turpentine, shoemakers' supplies, kid leather, corn products, foodstuffs, seeds, condensed milk and paper. References. Refer to Opportunity No. 23343.

St. Petersburg, Fla.—See "Sewerage."

Chicago, Ill.—Complete new plans for a comprehensive subway, opposed in most details to the recommendation of the subway commission, are now in the hands of Mayor Thompson and the City Council. The plans, submitted by Walston H. Brown Co. of New York and introduced into the council are said to find favor in the mayor's sight and are soon to be discussed by the transportation committee. The new plans provide for the expenditure of the $20,000,000 now in the traction fund and the additions thereto up to 1919, and the issuance of city bonds secured by the subway for further construction. The subway is to become the property of the city as fast as built, but is to be managed for twenty years under grant of ordinance by an operating company. The estimate for the entire project is $95,000,000, based on present prices of labor and materials, and the Brown Co. is willing to furnish the funds to build the subway over and above the amount in the traction fund. The proposed route of the subway covers 42 miles, 19 of which are to contain four tracks and 23 contain two tracks.

Crown Point, Ind.—Bids received Jan. 15, 1917, at 10 a. m., by Treasurer of Lake County, for sale, $7,800 ditch bonds, 5 per cent, five years. E. Simon, Aud.

Knox, Ind.—Starke county ditch bonds to the amount of $11,047.32 were sold to the J. N. Casady, Jr., Co., of Council Bluffs, Ia., for $150 premium and accrued interest.

Lafayette, Ind.—City presented with a tract of land known as Barbee's Grove, to be used as a city park; valued at $50,000.

Cumberland, Md.—City officials discussed building a municipal market on the site of the old water and electric light works which was just destroyed by fire.

Fitchburg Mass.—Discontinuance of the use of the space at the foot of the upper common for public highway purposes and the enlargement of the upper common park are recommended in the annual report of Guy H. Chase, commissioner in the Dept. of Streets and Engineering; also calls attention to the dangerous grade crossings at Bemis Rd. and Duck Mill Rd.

Haverhill, Mass.—Clearing the way for development of the Merrimack River from the sea to Lowell, Gen. W. M. Black, chief of the engineers of the War Dept., expressed approval of the plans which have been submitted. This means formal and official indorsement of the project. His approval means that should the state co-operate as is desired that the United States engineers will approve recommendations for appropriations to deepen the channel to 18 ft. all the way to Lowell.

Quincy, Mass.—City Council has passed an order for $10,000 for its share in the cost of deepening the channel of Fore River. Congress already has set apart $200,000, the state $75,000 and the Fore River shipyard $15,000. The plan calls for a depth of 33 ft. at low tide.

Grand Island, Neb.—City purchased Rentfrow Park at cost of $5.500.

Athenia, N. J.—Passaic county board of freeholders. County Engineer Ferguson submitted plans for the elimination of the dangerous "S" curve on Van Houten Ave. at Athenia at the United States government quarantine station, estimating that it would cost $62,700 for the actual work of improvment, exclusive of the property damage. It was decided to refer the matter to the engineer and county counsel to have them meet with the property owners and secure the best bargain that they can on the property needed.

Brooklyn, N. Y.—Board of Estimate & Apportionment resolutions were adopted appropriating $20,000 for a corporation yard and stable at 57th St. and 9th Ave; $150,000 for two refuse incinerators, one to be erected at Flushing and one at Jamaica; $22,000 for paths and walks at Forest Park, and $8,000 for a comfort station.

Niagara Falls, N. Y.—Councilman Gillet reported that tentative plans for the remodelling of the police headquarters building were ready. Estimated cost of providing additional cells was $10,610.-50, and of ten additional cells and an inside stairway, $11,500.

Schenectady, N. Y.—Common council unanimously indorsed the project to eliminate the State St. canal bridge and reduce the grade of the street to an approximate level.

Springfield, O.—Minter Ditch will be commenced by County Surveyor soon after February 9. The ditch will be located in Pleasant Twp., less than half a mile in length.

Harrisburg, Pa.—Collection of ashes and garbage by the city will be recommended by the City Health Bureau at the expiration of the present contract between the city and the Pennsylvania Reduction Co. as a result of the repeated failure of the company to give efficient service.

Wilkinsburg, Pa.—Sealed proposals will be received by the council of the borough of Wilkinsburg, Allegheny county, Pennsylvania, until 7.30 p. m., Jan. 8, 1917, for the purchase of $150,000

Stuart, Iowa.—Bids received as follows for extending waterworks system, including 38,400 feet pipe, 28 valves and 34 hydrants. Material to be furnished by city.

	Bid per foot for laying pipe. Bidder to fill ditch.	Bid per foot for laying pipe. City to fill ditch.	Extra each for setting valves.	Extra each for setting hydrants.
Dearborn Cons. Co., Waterloo, Ia.	$0.235	$0.195	$2.00	$3.00
Dunnegan & Briggs, Shenandoah, Ia.	.15	.12	3.00	3.00
Elkhorn Cons. Co., Fremont, Neb.	.17	.14	1.50	2.75
T. C. Brooks, Jackson, Mich.	.17	.....	2.00	2.00
J. L. Hansman, Des Moines, Ia.	.25	.....	3.00	3.00
J. W. Turner Imp. Co., Des Moines, Ia.	.24	.23	3.00	5.00
Hydraulic Conc. Cons. Co., Davenport, Ia.	.34	.26	1.00	2.00
Ward & Weighton, Sioux City, Ia.	.17	.15	2.50	3.00
Intermountain Bridge & Cons. Co., Tecumseh, Neb.	.18	.16	1.50	3.00
Michael McElligott, Evanston, Ill.	.149	.129	1.00	2.00
A. A. Dobson, Lincoln, Neb.	.17	.14	2.50	5.00
Wm. C. Frayer, St. Paul, Minn.	.21	.19	2.00	3.00
Des Moines Bridge & Iron Co., Des Moines, Ia.	.168	.148	1.50	2.50
Anderson & Empire, Marshalltown, Ia.	.18	.16	2.00	5.00
W. B. Lovell, Minneapolis, Minn.	.20	.18	2.00	3.00
G. Mancini, Florence, Neb.	.19	.13	1.30	3.25
Peter N. Cruse, Spencer, Ia.	.219	.194	.60	1.26
Moore-Seig Cons. Co., Waterloo, Ia.	.189	.164	1.00	3.50
C. W. Roland, Des Moines, Ia.	.16	.135	.50	1.25
Akin & Flutter, Corning, Ia.	.22	.19	1.00	2.00
Katz Cons. Co., Omaha, Neb.	.1475	.1325	2.00	5.00

Contract awarded to Dunnegan & Briggs, Shenandoah, Ia., at $4,794. City to do back filling. Theo. S. Delay, Creston, Ia.

Stuart, Iowa.—Following bids received December 12 for constructing disposal plant. T. S. Delay, engineer, Creston.

Christensene & Giles, Stuart, Ia., $9,401; *Ward & Weighton, Sioux City, Ia., $8,900; Pickers Eng. & Cons. Co., Sioux City, Ia., $10,985; Akin & Flutter, Corning, Ia., $11,200; G. Mancine, Florence, Neb., $10,198; Wm. C. Fraser, St. Paul, Minn., $10,-448; A. A. Dodson, Lincoln, Neb., $10,550; B. C. Lamar, Stuart, Ia., $11,700; Empire Cons. Co., Des Moines, Ia., $11,657.

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(Title)

4¼% per annum, tax free, bonds of said borough.

Beaumont, Tex.—If the recommendation of the business council of the chamber of commerce is carried out, the city council will shortly be asked to make some arrangement, either by bond issue or otherwise, to acquire the old Frisco property, formerly used by the fair, for a civic center site.

Dallas, Tex.—The $48,000 bond issue voted in Dallas County Levee Dist. No. 1 has been approved by the Attorney General's Department and will be ready for formal issuance as soon as the bonds can be printed. The bonds were ordered for work on the levee east of Wilmer.

Houston, Tex.—An inspection of the unloading of sand at Morgan's Point by government dredge boats was made by county official with the view of installing a ferry from Morgan's Point to Goose Creek, in order to serve the enormous traffic going to the oil fields. The sand is to be used for a landing and road. Bids are ordered advertised and county engineer to prepare specifications for Lynchbury Ferry.

Salt Lake City, Utah.—Proposal to sell tract near 13th East reservoir for park site was made to the city.

Centralia, Wash.—The city is considering the purchase of a garbage incinerator to take the place of the old garbage dump west of the city limits, thus permitting the transformation of the tract on which the dump is located into a public park.

Superior, Wis.—Chairman Andrew, of City Council, will select committee to investigate sites and to receive proposals for new city hall.

Galt, Ont.—Board of works has recommended the construction of a drain on Tait St. and cement curb and gutter on Bruce St. City clerk, Jos. McCartney.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Phoenix, Ariz.—Auto Club of America has let the contract for painting 500 road signs, to be used in and around the city.

Indianapolis, Ind.—For construction of the Harmon ditch, Marion county, *Carl Z. Jackson, of Greenfield, Ind., for $2,066.75.

Kokomo, Ind.—Bid received for the dump wagons to be used by the city next year in carrying away the garbage. *George H. Holzbog & Bro. Co., Jefferson City; $260 for each of the three wagons, or $780 for the entire number.

Grand Rapids, Mich.—If the city can agree upon giving away its garbage from Jan. 1 to June 1, 1917, the three-year garbage contract will be awarded to Henry Hartman, who offers 25 cts. per ton.

Minneapolis, Minn.—*Minneapolis Steel & Machinery Co., 426 Plymouth Bldg., $114.58; 118 street signs; purchasing agent, K. E. Alexander.

Moorhead, Minn.—*M. W. Barnard Co. of Minneapolis will construct a series of drain ditches in Clay County, under award from the county drain board. The work represents an investment of $32,234, which is approximately $1,500 under the engineer's estimates. *E. G. Fennely of Aitken, Minn., building several steel bridges.

Utica, N. Y.—For the collection of garbage in the new 16th Ward for one year to *Martin M. Mathews, $135 a month. Bd. of Contract & Supply.

Norfolk, Va.—Board of control, *Henry Watterfield, to furnish the street cleaning department with one spark arrestor for the crematory stack.

Spokane, Wash.—It is reported $26,000 contract has been let by the Hoodoo Valley Drainage district in Bonner Co., Idaho, for the work on draining the Hoodoo valley.

Spokane, Wash.—*Pure Oil Co. for furnishing gasoline for the city.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			SEWERAGE.	
Mich.,	Flint	Jan. 12..	Furnishing catch basins, manhole and crosswalk castings, sewer pipe and Portland cement	D. E. Newcombe, City Clerk.
Minn.,	Worthington	11 a.m., Jan. 13..	Constructing drainage ditch No. 3, requiring 6 to 22-in. tile; estimated cost, $13,750	Gus Swanberg, Co. Aud.
Minn.,	Worthington	11 a.m., Jan. 13..	Constructing drainage ditch No. 4; est. cost, $23,000	Gus Swanberg, Co. Aud.
S. D.,	Canton	10 a.m., Jan. 15..	Constructing drainage ditch No. 17	G. A. Lomen, Co. Aud.
Okla.,	New Cordell	Jan. 15..	Constructing sewerage sys. and sewerage dis. plant	Benham Engrg. Co., Colcord Bldg., Okla. City, Okla.
Ia.,	Dows	2 p.m., Jan. 23..	Sewer system, requiring 50,000 ft. 6 to 15-in. sewer and one septic tank	M. Tschirgi & Sons, Engrs., Amer. Trust Bldg., Cedar Rapids, Ia.
			WATER SUPPLY.	
Ia.,	Dakota City	Jan. 9..	Constructing waterworks system	Lawrence W. Cox, 1316 E. 12th St., Des Moines, Ia.
O.,	Cambridge	Jan. 10..	Constructing waterworks system	City Clerk.
Ariz.,	Yuma	Jan. 12..	Constructing intake 745 ft. long and 60 ft. wide on Colorado River; cost, $200,000	Imperial Irrigation District, El Centro, Cal.

STREETS AND ROADS

Little Rock, Ark.—A petition presented to the State Highway Commission for the largest road district yet organized under the provisions of the Alexander law. It will comprise the entire county of Phillips with the exception of the extreme northeast corner, for the building of 146 miles of good road, consisting of three main lines and eight laterals, centering in Helena. No estimate has been made of the cost of the highways, nor is its cost given. It is probable that the preliminary surveys will be commenced by the department.

Fort Smith, Ark.—City automobile owners interested in making permanent driveway over Mount Vista.

Washington, D. C.—The engineer department is now at work on plans for improving B St. northwest between 7th and 12th Sts., with durex blocks and asphalt.

St. Petersburg, Fla.—See "Sewerage."

Cedar Falls, Ia.—Whether to put off further street paving work until 1918 and then carry through a big program of street improvement, or do some street paving both during 1917 and 1918 was discussed at some length by the Council.

Hampton, Ia.—City Council proposed that the city pave 92 blocks during the coming season.

Marshalltown, Ia.—Preparations are being made by the supervisors and Co. Engr. H. O. Hickok so that the Board may open bids for building the county's 4-mile section of the hard-surfaced Marietta-Albion Rd. in February.

Boston, Mass.—Bill filed with House of Representatives for the completion by the Metropolitan Park Commission of the Old Colony Parkway in Dorchester at an expense of $100,000.

Detroit, Mich.—Park Comr. Dust makes many recommendations for the improvement of the park and boulevard system in his annual report. The resurfacing of the Grand Boulevard with a hard-wearing surface should be completed. On Belle Isle there are about 20 miles of roadway which should also be covered with a permanent surface. The roads in Palmer Park are now being subjected to greatly increased traffic, and liberal appropriations should be provided for their care and particularly for rebuilding and widening the one around the nursery.

Chillicothe, Mo.—City Engr. was instructed to prepare plans and specifications for improvement of Jackson St. between Elm and Vine Sts.

Roswell, N. Mex.—Election Feb. 6 to vote on the question of issuing road bonds to the amount of $100,000.

Brooklyn, N. Y.—Bd. of Estimate passed a resolution appropriating $2,000,000 for repaving streets in all the boroughs.

Ogdensburg, N. Y.—Northern New York autoists are watching with interest the agitation in Ottawa and elsewhere in the province of Ontario, looking to the construction of an automobile highway between Ottawa and Prescott. The proposed highway would cost around $600,000.

Rochester, N. Y.—The ordinance for Genesee Park Blvd. pavement from Genesee St. to Brooks Ave. was adopted after being amended to provide for the construction of a storm water sewer for the section from Genesee Park Blvd. to Fairview Ave.

Rochester, N. Y.—Ordinance introduced for an asphalt-block pavement in Atlantic Ave. from Culver Rd. to Winton Rd., a distance of about a mile, at a cost of $87,500; and for the construction of cement walks in Scio St. at a cost of $3,500.

Rochester, N. Y.—See "Sewerage."

Rome, N. Y.—City Atty. and City Engr. were directed to confer with the proper state officials with a view to securing improvement by paving of E. Whitesboro St. from S. James St. to the Black River Canal.

Rome, N. Y.—City Engr. will make a list of number of streets to be paved next summer.

Rome, N. Y.—The petition for a crosswalk on Turin St. at Croton St. will be attended to by the City Engr.

White Plains, N. Y.—Bronx Parkway Bonds to the amount of $122,000. Messrs. R. M. Grant & Co., of New York, were the successful bidders, paying a premium of $4,975.16 minus 104.078, a basis of 3.79 per cent. Bidders: Farson Sons & Co., 103.73; Callaway, Fish & Co., 103.34; Cummings, Prudden & Co., 103.18; J. S. Bache Co., 103.08; Harris, Forbes & Co., 102.91; H. A. Kahler & Co., 102.85; Hornblower & Weeks, 102.57; Stacy & Braun, 102.41; Geo. B. Gibbons & Co., 102.38; Adams & Co., 102.28. Robert A. Patteson, County Controller.

Middletown, O.—County Engr. Fred Hammerle and his assistants will begin making a survey of the Middletown bridge, preparatory to the paving with brick.

Sandusky, O.—The 1917 county road program aproved by the County Commissioners calls for 7.85 miles of improvements to four roads at a cost of $159,500. This will be submitted to the State Highway Commissioner and upon its approval by him conferences will be held with village councils for the purpose of apportioning that portion of the cost not taken care of from the state fund.

Wilkes-Barre, Pa.—See "Sewerage."

Newport, R. I.—Petitions were received for the granolithic walk on the south side of Pond Ave; double coat asphalt macadam on Bliss Rd.; curbing

and grading the east end of East Bowery St.; a granolithic walk on the south side of Church St.; a sewer in Sagamore, Conanicus and Pennacock Sts.; a granolithic sidewalk on Barney St. between Mt. Vernon St. and Whitfield Court; an electric light on Kay St., near Powel Ave.; granolithic on Pearl St.; granolithic on the north side of Willow St. between Third and Fourth; granolithic on the west side of Third St. between Willow and Walnut; granolithic on Second St., between Sycamore St. and Van Zandt Ave. All were referred to the Representative Council.

Charleston, S. C.—Alderman Pinckney and Mayor Hyde were authorized to proceed in securing specifications for the extension of the Blvd. and driveway to the west end of Tradd St.

Dallas, Tex.—The County Commissioners' Court arranged for issuance of the $500,000 road bonds voted upon on Nov. 7, engaging J. L. Goggans to prepare the necessary bond record for approval at Austin and for submission to attorneys for bonding firms who may wish to purchase the bonds.

El Paso, Tex.—See "Sewerage."

Houston, Tex.—Street paving and water extension in 1917 will be benefited by an issue of $100,000 city bonds shortly after Jan. 1; construction of the proposed South Side water plant and the paving of Washington and Harrisburg Blvds. Three-fourths of the sum will be devoted to the new water plant, which will be located at the end of Caroline St. north of Hermann Park. Seven wells will be sunk and a pumping plant built.

Waxahachie, Tex.—Paving orders passed by the City Council; total, approximately $160,000. Work on the streets is to begin just as soon as the City Engr. can prepare specifications and contracts can be awarded. The area to be paved totals a little more than 5 miles.

Portsmouth, Va.—Public Service Dept. to pave between Washington and Harrison Sts., with Belgian block or some other kind of temporary pavement until the ground has settled sufficiently to allow the laying of a permanent plastic pavement.

Staunton, Va.—Board of Supervisors to ask federal aid on Augusta roads.

Everett, Wash.—Council decided to begin work of repairing pavement on street between Ave. A and Ave. B where street level was lowered. Hans Mumm, Jr., City Engr.

Kelso, Wash.—Widening of the Pacific Highway from the Kelso city limits to the old Northern Pacific right of way around Rock Point is one of the projects which will be undertaken in Cowlitz County by the State Highway Commission next summer.

Seattle, Wash.—Council adopted a resolution declaring their intention to submit a bond issue at the general election March 6, 1917, for the purpose of improving the following main arteries leading from the center of the city: Seattle Blvd. and other streets, from 6th Ave. South to 9th Ave. South, $50,000; Spokane St. and West Spokane St. from 8th Ave. South to Alki Ave., $125,000; Westlake Ave. from Valley St. to Fremont Ave., by widening pavement, $25,000; Elliott Ave. and other streets, from Bay St. to 15th Ave. West, $150,000, and Leary Ave. from Fremont Ave. to 20th Ave. Northwest, $100,000.

Parsons, W. Va.—Two out of three districts in Tucker County, W. Va., voted to improve their roads. Two hundred and ten thousand dollars will be expended for good roads this year. Fairfax district approved the issuing of $150,000 bonds and Dry Fork district voted to expend $60,000. A bond issue of $98,000 was turned down by the voters of Davis district by a small majority.

Winnipeg, Man.—City Council will have Osborne St. bridge paved next year. City Engr., W. P. Brereton.

Niagara Falls, Ont.—City plans widening portion Queen St. City Engr., W. C. Jepson.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Grove Hill, Ala.—*J. H. Linch, Dadeville, Ala., at $70,000, for improving roads in county. A. L. Smith, county engineer.

St. Cloud, Fla.—City to *Georgia Engr. Co., Augusta, Ga., at $14,245, for paving 11,000 sq. yds. with re-pressed brick on sand base with sand filler. Fred B. Kenney, Clerk.

Anderson, Ind.—*Daniels & Lyst, Anderson, are the low bidders for the construction of East Lynne St., which has been ordered paved with concrete in the county's annual award of contracts for building 3-mile roads. Twenty or more firms were represented. The county board has ordered the construction of 10 roads during the year 1917, and these are the contracts on which bids were received. Three of the roads are to be constructed of concrete, one in Union Twp., is to be built of rocmac, and six are gravel. One of the concrete roads, East Lynne St., will be built in Anderson, and two are in Elwood. Four of the six gravel roads will be in Lafayette Twp., one in Green and one in Monroe. Bids for the E. B. Schalk Rd., Anderson, were Hutton-Harris Const. Co., $42,250, and Daniels & Lyst, $41,995. For the Chas. M. Nick Rd., Elwood, were as follows: Daniels & Lyst, $43,690; Burke Bros.' Const. Co., $44,700; Davis Const. Co., $39,068; Madison Const. Co., $43,800; Dalton Const. Co., $39,780. For the Jos. H. Glass Rd., Elwood, were: Burke Bros.' Const. Co., $18,300; Daniels & Lyst, $18,400; J. D. Reason & Co., $16,490; Dalton Const. Co., $17,825; Davis Const. Co., $17,561, and Madison Const. Co., $17,550. The James Millspaugh Rd., in Union Twp., received three bids: J. D. Reason & Co., $23,100; W. J. Neidhart & Co., $23,150; Daniels & Lyst, $22,995. Eight bids were submitted for the Jacob Fox Rd. in Lafayette Twp., as follows: George W. Hoppes, $2,374; Bronnenberg & Bronnenberg, $2,033; H. S. Byers Const. Co., $2,954; Sullivan & Sullivan, $2,725; Moore & Michael, $2,597; S. R. Burton, $2,525; Daniels & Lyst, $3,084; M. M. Walker & Son, $2,926. Bids for the Clem No. 1 road in Lafayette Twp. were as follows: Clarison Chambers, $2,760; A. B. Huffman, $3,050; Wade H. Davis, $3,349; J. D. Reason & Co., $3,990; S. R. Burton, $3,875; H. S. Byers Const. Co., $3,670; Geo. W. Hoppes, $3,850. Seven bids were submitted for the Clem No. 2 road, in same twp.: Clarison Chambers, $2,500; A. B. Huffman, $2,900; Wade H. Davis, $2,525; J. D. Reason & Co., $3,158; S. R. Burton, $2,950; H. S. Byers Const. Co., $2,952; Geo. W. Hoppes, $2,850. The Geo. Cunningham Rd., in Lafayette Twp., received nine bids: Clarison Chambers, $8,990; A. B. Huffman, $9,000; J. D. Reason & Co., $9,950; Sullivan & Sullivan, $9,375; S. R. Burton, $9,490; H. S. Byers Const. Co., $10,149; Jas. Johnson, $9,327; Bronnenberg & Bronenberg, $7,641; Geo. W. Hoppes, $9,789. Bids for the Carlos S. Raynor Rd., Green Twp., follow: Burke Bros.' Const. Co., $9,541; J. D. Reason & Co., $8,770; Sullivan & Sullivan, $9,235; S. R. Burton, $8,975; H. S. Byers Const. Co., $9,650; M. M. Walker & Son, $10,400. The L. E. Baxter Rd., Monroe Twp., received bids as follows: S. R. Burton, bid No. 1, $2,950; S. R. Burton, bid No. 2, $2,700; Sullivan & Sullivan, $2,415. The following are the successful bidders: Daniels & Lyst—Charles Nick Rd., E. B. Schalk Rd. and James Millspaugh Rd. J. D. Reason & Co.—Carlos Raynor Rd. and J. H. Glass Rd. Clarison Chambers—E. C. Clem Rds. Nos. 1 and 2. Bronnenberg & Bronnenberg—Jacob Fox and George Cunningham Rds. Sullivan & Sullivan—L. E. Baxter Rd..

Evansville, Ind.—Board of Public Works for the construction and repair of sidewalks for the year of 1917, where property owners fail to have the work done by private contract within the time allotted them. The award of contract was postponed. The bids were as follows: W. H. Grammer Constr. Co., $1.14 3-24 per sq. yd.; 41 cts. for curbing; 67 cts. for steel bound curb and gutter; 40 cts. for extra excavating and 52 cts. for combined curb and gutter. Bennett Whitehead, $1.17 per sq. yd.; 40 cts. for curbing; 55 cts. for steel bound curb and gutter.

Portland, Ind.—The Kuder Rd. in Madison Twp., Jay County, will be built by *W. M. Ireland, $17,200. Macy Rd., in Jackson Twp., by *John Heitzman, of Randolph county, $14,320.

Fort Scott, Kan.—Walkertown Rd., 7½ miles, *F. D. Martin Constr. Co., Kansas City, Mo., $3,995 per mile. R. W. Toles, Co. Engr.

Fort Scott, Kan.—Pawnee Rd., 117 miles, *Thogurartin & Gardiner, Fort Scott, Kan.; $4,100 per mile. R. W. Toles, Co. Engr.

Hernando, Miss.—*F. D. Harvey Co., Olive Branch, Miss., for constructing 3¾ miles of dirt road, requiring 32,000 cu. yds.

Somerville, N. J.—For macadamizing Chimney Rock Rd., about 1½ miles, including elimination of curves and cutting down mountain for suitable grade, was from Richards & Gaston, Somerville, at $67,041. Lowest bid received by Bd. Freeholders.

Stone Harbor, N. J.—For improving streets and avenues of South End: So. Jersey Realty Co., 3rd and Walnut Sts., Philadelphia, Pa., $14,499; *Sutton & Corson Co., Ocean City, $17,954; Lewis S. Chester, Sea Isle, $21,267. By Common Council.

Oklahoma City, Okla.—City to *Sandringham Constr. Co., Oklahoma City, at $16,638, for paving Lincoln Blvd.

North Yakima, Wash.—Permanent Highway No. 21, Dec. 26, County Commissioners Yakima County, grading and graveling 1 mile: *H. E. Mathieson, Sunnyside, Wash., $11,280.

Welch, W. Va.—County, for grading and constructing bridges (one section each), to *S. S. Walker & Co., at $241,678; *T. Towles & Co., Princeton, W. Va., at $279,812; *M. L. Tackett, Mt. Sterling, Ky., at $61,278.

SEWERAGE

St. Petersburg, Fla.—Bond election Feb. 16 to vote $180,000 on needed municipal improvement: Purchase of railroad lots, $12,000; improvements to city pier, $2,800; septic sewerage system, $30,000; purchase water lot No. 4, $20,000; purchase of Cook property, $16,200; brick paving, $4,000; fill and sea wall, $90,000; building improvements, $5,000.

Nez Perce, Ida.—The Village Council is considering the question of issuing sewerage system bonds to the amount of $35,000.

Streator, Ill.—City considering installing sewage disposal plant. F. Rentz, City Engr.

Fort Wayne, Ind.—The Fort Wayne Foundry & Machine Co. to raise its cupola and build under it a series of "I" beam supports to arch over the intercepting sewer. When this is done workmen will enter the big sewer and repair its broken walls from the inside. It will cost approximately $150 to make these repairs, as it will not be necessary to excavate from the surface to the sewer level 30 ft. below

Dows, Ia.—Contracts for constructing sewer system will probably be let January or February. W. F. Wodekin, Town Clerk.

Sioux City, Ia.—City Engr. arranged for construction of the North Riverside sanitary sewer system. Plan calls for one pumping station and one storage tank. Gravity will carry the disposal from the Milwaukee shops and surrounding district to a large pit, to be erected at Hornick St. and Riverside Blvd. Here a pump will force the sewage up into a storage tank. From the storage tank the sewage will drop a distance of several feet and then will travel up hill through the mains for a distance of 4,100. At a point near Riverside Park the sewer will begin to drop and the gravity will carry the disposal from this point to the outlet in the Missouri River. If this plan is abandoned, the city will be forced to erect two pumping stations.

Rochester, N. Y.—The following final ordinances were adopted: Additional lighting in Frank St. from Jay St. to Bloss St.; sewers, walks and grading in Kingsbury St., Garson Ave., Winton Rd., Oneida St., Grafton St. and Brookdale Ave.

Rochester, N. Y.—See "Streets and Roads."

Wilkes-Barre, Pa.—City Engr. B. K. Finch in his annual report recommends that the East End sewer on Scott St. be completed· improvements along Solomon's Creek be carried to further completion; all bad brick pavement be torn up and relaid on concrete foundation; a big sewer be constructed for the 15th ward; all curbing be laid on concrete base; a new bridge be erected on Hazle St. near McLean St.; all bridges be reinforced and permanent floors laid; a horse and wagon be appropriated for the sewer dept.; property owners lay sidewalks where needed.

El Paso, Tex.—The election in favor of issuing the following bonds: Septic tanks, $100,000; storm sewer, $75,000; street improvement, $40,000; sewer extension, $10,000. Tom Lea, Mayor.

Dundas, Ont.—For the construction of trunk sewers and connections with a sanitary sewer system and sewage disposal works. The Town Council will